MODEL
MRA-25-10

ATLC-107-896-100
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TECHNICAL MANUAL FOR INTERFACE ADAPTER

Atlantic Research Corporation
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NOTICE

This manual replaces the Interface Adapter Instruction Manual (ATLC-107-896-100, Issue 1 May 1981). It incorporates several addenda and adds the following IFA products not available when the first issue was published: IFA-18, -20, -21, -22.

Atlantic Research Corporation reserves the right to make improvements to the manual and the product without prior notice.

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APPENDIX A. INTERFACE STANDARDS

APPENDIX B. SIGNAL EQUIVALENTS

APPENDIX C. V.35 APPLICATIONS INFORMATION

APPENDIX D. CONNECTORS AND T-CABLES

TABLE 1-1
INTERFACE ADAPTER MODEL PAIRS (CONVERTERS)

DTE (Note 1)	Model	Common	Model	DCE (Note 1)
X.20/21 (15 pin)	IFA-10-1	RS-232/V.24	IFA-11-1	X.20/21 (15 pin)
RS-449	IFA-12-1	RS-232/V.24	IFA-13-1	RS-449
RS-449 (incl. 9 pin)	IFA-12-2	RS-232/V.24	IFA-13-2	RS-449 (incl. 9 pin)
Bell 303	IFA-14-1	RS-232/V.24	IFA-15-1 (Note 2)	Bell 303
Bell 303	IFA-14-1	RS-232/V.24	IFA-15-2 (Note 3)	Bell 303
V.35, English (Note 4)	IFA-16-1	RS-232/V.24	IFA-17-1 (Note 2)	V.35, English (Note 4)
V.35, French (Note 4)	IFA-16-2	RS-232/V.24	IFA-17-2	V.35, French (Note 4)
V.35, European (metric kit, no locking) (Note 4)	IFA-16-91	RS-232/V.24	IFA-17-91	V.35, European (metric kit, no locking) (Note 4)
Current Loop	IFA-18-1	RS-232/V.24	IFA-18-1	Current Loop

Note 1: General Connector Convention: DTE toward DCE is male, DCE toward DTE is female.
Note 2: Adapter cable provided.
Note 3: Female DCE, no adapter cable needed.
Note 4: French and European models use 0.040 in. (1 mm) V.35 pin diameter. English is 0.062 in.

TABLE 1-2
HIGH-SPEED ADAPTERS (SATELLITE)

DTE	Model	DCE
RS-449	IFA-20-1	V.35
V.35	IFA-21-1	RS-449

SECTION 1
INTRODUCTION: COMPONENT SELECTION

Atlantic Research Corporation manufactures several different types of IFA modules.

IFA models 10-17 are data communications interface adapters which convert various U.S., international, and industrial standard interfaces to the popular standard Electronic Industries Association (EIA) RS-232C, which is comparable to the International Telephone and Telegraph Consultative Committee (CCITT) standard set V.24.

For models 10-17, there is a pair of modules for each interface type: one with RS-232/ V.24 toward the Data Terminal Equipment (DTE), and one with RS-232/V.24 toward the Data Communications Equipment (DCE).

See Table 1-1. The module pairs are the following:

1. IFA-10 and -11 for X.20/X.21 interface.
2. IFA-12 and -13 for RS-449 interface.
3. IFA-14 and -15 for the Bell 303 interface.
4. IFA-16 and -17 for the V.35 interface.

The IFA-18 is a current loop interface adapter which can be used to convert full-duplex or half-duplex current loops to RS-232/V.24 DTE or DCE (see Table 1-1 and Section 9). It can also be used to monitor current loop data lines with standard RS-232/V.24 data monitors (see Table 1-3).

TABLE 1-3
IFA MONITORS

Monitored Interface	Model	Common
X.20	IFA-22-6	RS-232/V.24
RS-449 Primary	IFA-22-2	RS-232/V.24
RS-449 Secondary	IFA-22-7	RS-232/V.24
Bell 303	IFA-22-5	RS-232/V.24
V.35	IFA-22-3	RS-232/V.24
V.35 European	IFA-22-4	RS-232/V.24
Current Loop	IFA-18-1	RS-232/V.24

TABLE 1-4
MOUNTING RACK ASSEMBLIES

Mounting Panel: MRA-25-2	Holds any two IFAs. 115/230 V, 50/60 Hz Power (built in)
Mounting Rack: MRA-25-10	Holds any ten IFAs. Includes Power Maintenance Module. 105-115/220-230 V, 50/60 Hz Power Uses remote supply PS-27-1 (ordered separately). Dc power cable CA-33-1 (ordered separately) connects PS-27-1 to MRA-25-10.

IFA models 20 and 21 are interface adapters which convert RS-449 to V.35 DTE or DCE in satellite data subscriber applications. IFA-20 and -21 can also be used in other high data rate applications (see Table 1-2 and Section 10).

The IFA-22 (see Table 1-3) is a high-impedance interface monitor adapter which adapts the widely used interfaces to RS-232/V.24. With user-supplied cables, the IFA-22 can also adapt other low-voltage interfaces to RS-232/V.24 (see Section 11).

Comprehensive discussions of interface types are in Sections 5-11 of this manual. A more complete listing of standard interface specifications and descriptions can be found in the appendixes.

The basic modules, or modifications of them, may be used in pairs or in any combination in the Atlantic Research Mounting Rack Assemblies (MRA).

Two Mounting Rack Assemblies (MRAs) are available to house and power the IFA modules (see Table 1-4). The MRA-25-10 accommodates up to ten adapter modules in a 19-in. standard EIA rack. The MRA-25-2 can accommodate one or two adapters, and can be mounted either on a desk or in a standard EIA rack mount shelf. See Sections 3 and 4 for a detailed description of MRA models.

SECTION 2
CAPABILITY

The Atlantic Research IFA modules serve as line buffers. They receive and retransmit signals. The maximum recommended cable length for each interface may be used on both connections to an adapter module at data speeds compatible with both interfaces.

Even though the RS-232/V.24 specification is defined below 20 kbps, the Bell 303 and V.35 adapter modules will work to the full limit of the faster interface. X.20/X.21 and RS-449 interface adapter modules will regenerate clean signals beyond 800 kbps. However, working above 20 kbps may impose shorter cable lengths on the RS-232/V.24 equipment.

Each IFA module has its power supply individually regulated, making it immune to ac line voltage fluctuations.

All IFA modules have a 16-pin DIP socket position on which all signals appear in inverted phase TTL logic levels. This could be used in a laboratory situation to monitor interface signals.

Charts appear at the end of Sections 5 through 10 showing signals and pin numbers for this test socket position.

The MRA-25-2 is self-contained and powers two adapter modules. The MRA-25-10 uses a dc power system allowing optional add-on backup power and holds ten adapter modules.

IFAs -10 through -13 comply with the more stringent MIL-STD-188-114, Section 4.4. This specification relates to FED-STD-1020 and -1030, which in turn call out the EIA RS-422 and RS-423. The parameter values in the MIL-STD-188-114 are identical to the corresponding values in the other specifications with the exception of the (V_{os}) balanced generator offset voltage which is reduced to 0.4 volt, requiring dual power supply voltages of plus and negative polarities for the drivers.

The X.20/X.21 and RS-449 interface adapter modules ensure compatibility with other low-level EIA and CCITT standards and with older equipment because they comply with the more stringent subset.

MIL-STD-188-114 supersedes subparagraph 4.3.1.3 of MIL-STD-188-100 and subparagraph 7.2.1 of MIL-STD-188C. These standards are available from the U.S. Government Printing Office.

SECTION 3
MRA-25-10 RACK MOUNT

3.1 DESCRIPTION

The Mounting Rack Assembly, model MRA-25-10, mounts and distributes power for up to ten standard IFA plug-in modules. The source of dc power is external to the rack but the unit includes a Power Maintenance Module which contains fuses, power status indicator lights, and an alarm function to aid in rapid fault location and correction.

On the front panel are only two lights and one momentary action pushbutton switch, the only operator control. It silences the audible alarm and returns the flashing panel lights to the steady status function. (See Section 3.4.3.)

The standard 19-inch EIA rack mounting unit uses only 7 inches of rack space height with interface cables attaching at the rear.

A power supply capable of supplying three MRA-25-10s (thirty adapter modules) takes up only 5 1/4 inches of rack space and may be separated by 10 feet (3.048 meters) of cable. Two supplies may be connected to any rack unit to provide power redundancy.

CAUTION: Read and follow the installation procedures before connecting power to unit.

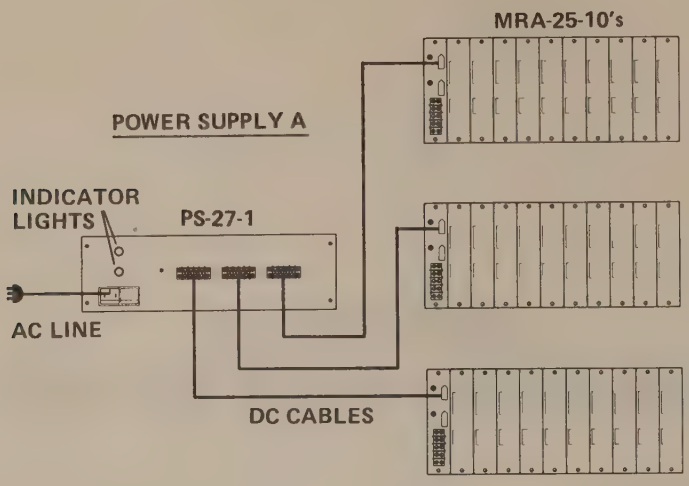

FIGURE 3-1 Single Power Supply System

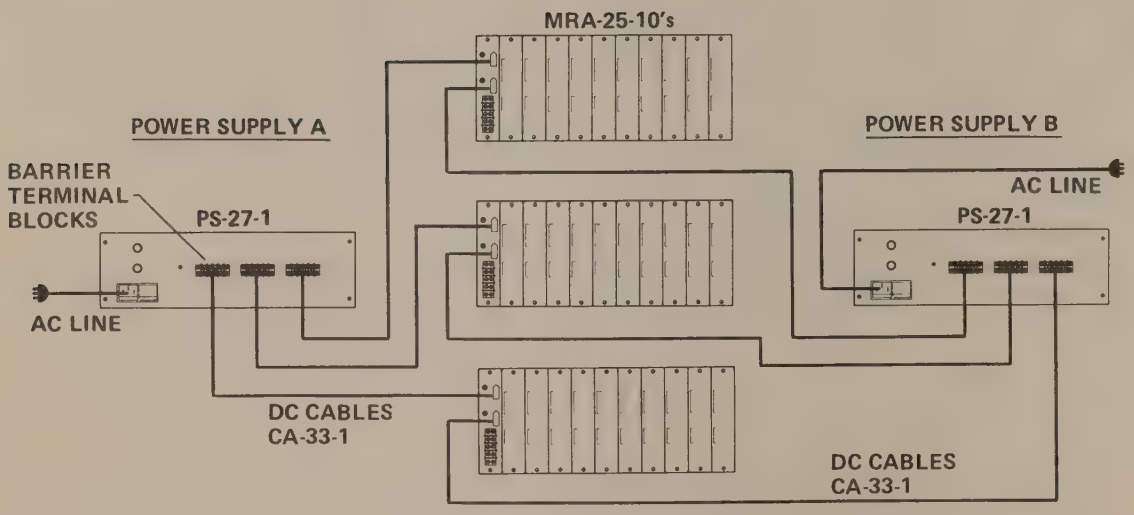

FIGURE 3-2 Power System With Back-up Supply

3.2 SPECIFICATIONS

Dimensions
- 19 in. wide (with mounting ears) x 7 in. high x 8 3/4 in. deep
- 48.26 cm wide x 17.78 cm high x 22.23 cm deep

Weight
- 6 lb 14 oz (3.12 kg) with ten blank panels

Remote alarm relay
- Dry circuit through 1 A inductive

Power
- Operates from PS-27-1 (see Section 3.8.1)

Finish
- Black grained anodize

Alarm (see Sections 3.5-3.6)
- Fall to 100-90 V ac*
  - Voltage tolerance ±10% of rated line
  - Data fails: Below 70 V ac
  - Full volume sound: Above 50 V ac
  - Some sound: Above 30 V ac
  - Failsafe: Relay drops below 15 V ac even

NOTICE: All specifications are subject to change without notice.

3.3 POWER SYSTEM

Figure 3-1 shows the PS-27-1 power supply supporting three MRA-25-10s. For back-up power, a second PS-27-1 can be connected. Figure 3-2 shows the full economy system. Having three units on two supplies on two circuits for back-up power takes full advantage of the capabilities of all units.

Other combinations are also possible. Consider a situation, for example, where thirty adapters are required but where twenty or less need back-up. Two supplies could share just two rack units and each still power its own third unit. Total: four units, two supplies, six cables, two of the units with back-up. While this may be an unusual application, it demonstrates that a system can be easily modified and expanded.

The PS-27-1 rating for three MRA-25-10 racks is based on the assumption that all racks are fully loaded with modules requiring the highest currents. When the system is used as directed, there should never be an overload situation.

*For 220-V operation the values will be approximately double those given.

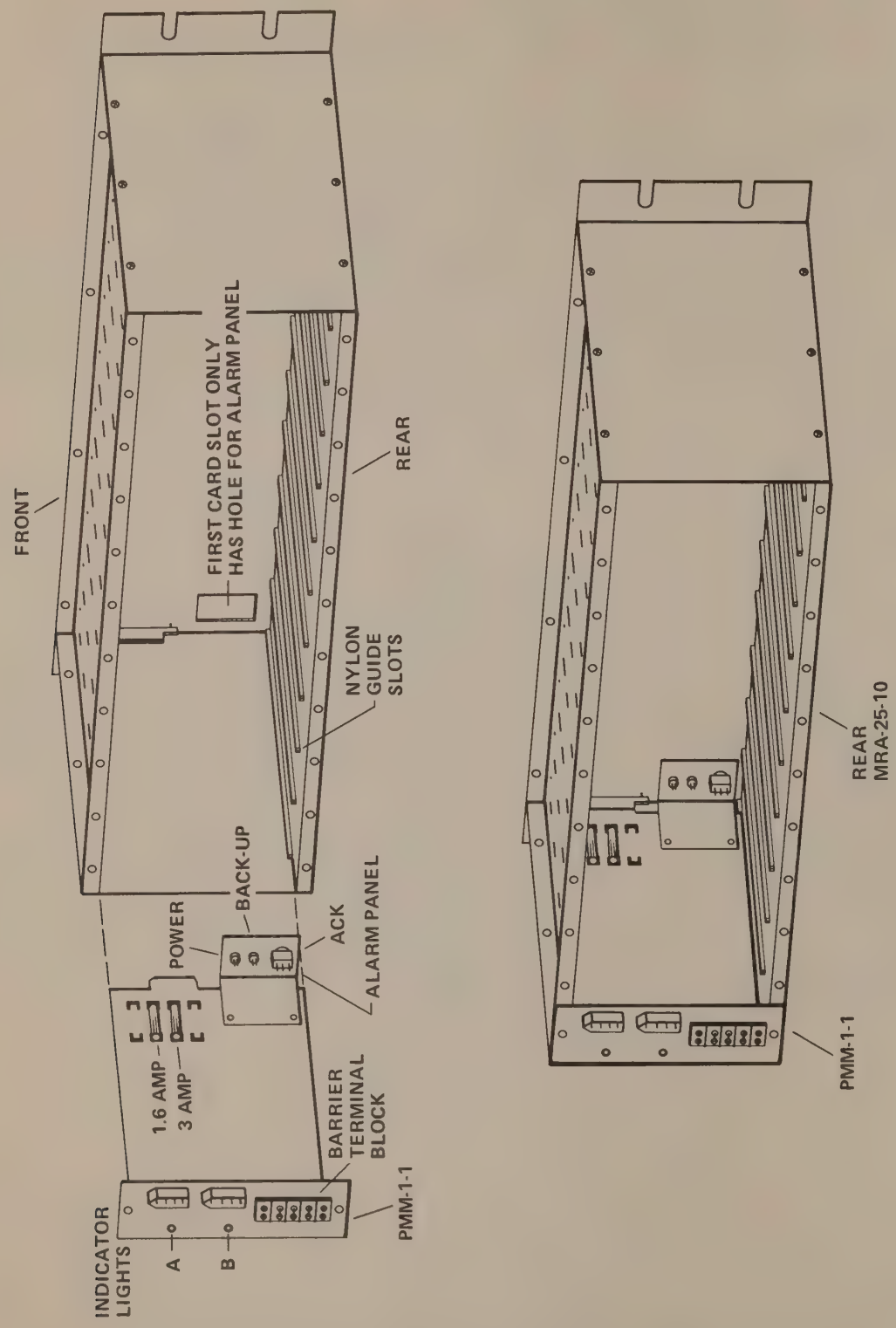

FIGURE 3-3 Rear View: Mounting Rack Assembly, MRA-25-10

It is electrically possible to operate additional racks on a PS-27-1. A competent technician can add the rated currents of each module, both positive and negative, and be sure that neither total exceeds the positive 10 A or negative 5 A supply capacities. The technician may wish to scope the positive and negative outputs to be sure that minimum ripple voltage does not drop below 15 V. Do not try to raise dc voltage by using a lower ac input than is indicated by actual ac line voltage. This will force the supply to dissipate more heat than it is designed to and will damage the equipment.

CAUTION: Do not try to raise dc voltage as it will result in damage to the equipment.

CAUTION: Customer will be responsible for an overload to the system if this type of change is effected.

The additional dc power cables may be connected to the PS-27-1 simply by adding the new cable spade lugs under the terminal block screws for another rack. Care must be taken that back-up power is present so that the system is able to tolerate a power interruption on the affected data channels. An alarm will probably be generated during this operation.

3.4 SYSTEM INDICATORS; TROUBLESHOOTING

The MRA-25-10 normally requires no operator attention. The operator has been given very simple and yet crucial diagnostic power (see Sections 3.5 and 3.6 and Figure 3-5).

3.4.1 Power Supply PS-27-1

Two indicator lights are located on the front panel of the PS-27-1 (see Figure 3-1). Both lights ON indicates that the supply is working. One light OFF suggests power supply failure. Check lights A and B on the rear of the Power Maintenance Module (Section 3.4.2; see Figure 3-3). Both lights OFF suggests ac failure. Check plug and fuse.

3.4.2 Power Maintenance Module PMM-1

Two indicator lights, A and B, are located at the rear of the MRA-25-10 (Figure 3-3). Both lights ON indicates that both supplies are adequate. Just one light OFF indicates that there is no back-up. Check the associated cable and supply. If A and B lights are both OFF, probably neither supply is sufficient and, therefore, data probably cannot pass through the adapter modules. Check for data. Check cables to PS-27-1.

3.4.3 Alarm Panel

The alarm panel is located at the front of the MRA-25-10. There are two indicator lights on the panel, labeled POWER and BACK-UP (see Figure 3-4), directly above the red ACKnowledge Button (ACK).

If the POWER light is OFF, the rack of adapter modules is not powered. Data probably cannot pass. Check for data. If there is none, then check the fuses on the Power Maintenance Module PC board. This POWER light must be ON regardless of other indicators.

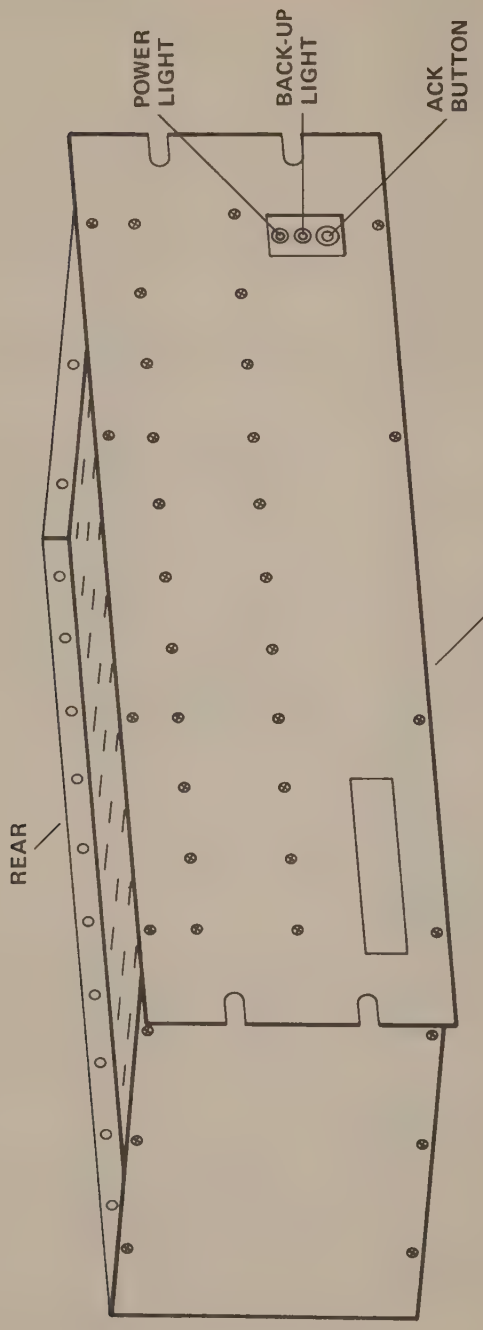

FIGURE 3-4 Front View: Mounting Rack Assembly, MRA-25-10

The BACK-UP light simply means that A and B lights are ON. The conditions for back-up power have been met and two adequate supplies are connected. See Current, Section 3.8.1. BACK-UP does not mean that the adapter modules are powered. Check POWER light.

3.5 ALARM PROCEDURE

If a possibly consequential power fault occurs, the unit will automatically: 1. Sound a pulsating buzz alarm. (The buzz may be disabled internally; see Section 3.7.) 2. Flash the two red alarm panel lights (POWER and BACK-UP) to show the source of the sound. When this happens, depress and release the red ACKnowledge Button directly below the flashing lights (it is the only control on the panel). The buzz will stop and the lights will return to their normal function of showing the status of the rack power (Section 3.4). An alarm may always be silenced by pushing the ACK button.

NOTICE: The alarm may mean that the flow of data through the interface adapters has been interrupted. The red lights now showing status will help determine the urgency of the situation.

The top light on the alarm panel is labeled POWER. If the POWER light is OFF, this indicates that adequate dc power to the adapter modules has been lost. Immediately check for data flow. Take appropriate action until the fault is corrected. If the POWER light is ON, then data should be able to flow through the rack unit. Check the light labeled BACK-UP. If it is OFF, then there is not sufficient voltage from the back-up supply to power the rack if the other PS-27-1 should fail. If this light is ON, two supplies are supplying adequate dc voltage to the rack and may share the load.

NOTICE: POWER light must be on if adapters are to work.

3.6 ALARM CAUSES

Whenever dc voltage of either positive or negative polarity from either supply drops below a fixed level, an alarm will be initiated. Likewise, if power to the modules fails because of open protective fuses, an alarm will be initiated. Once the alarm is sounded, it will continue until acknowledged. Even a momentary inadequacy on only one power wire will give an alarm. This might indicate an intermittent cable or a loose connector. If all leads fail except for half voltage on any one lead, the alarm will still be capable of sounding normally. Any power failure this massive would be a deterrent to communications.

It is obvious that many different threats to data integrity can cause an alarm to sound. Common threats include defective ac line breakers, plugs, or cables, blown fuses, or a faulty supply. The value of a functional back-up supply powered from a separate ac circuit and phase is evident. Figure 3-5 shows that the probable cause of failure can be found by observing the indicator lights. If it appears that data flow is impeded, check first for data, then proceed with diagnosis and repair.

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FIGURE 3-5 MRA-25-10: Power Maintenance Diagnostic Guide

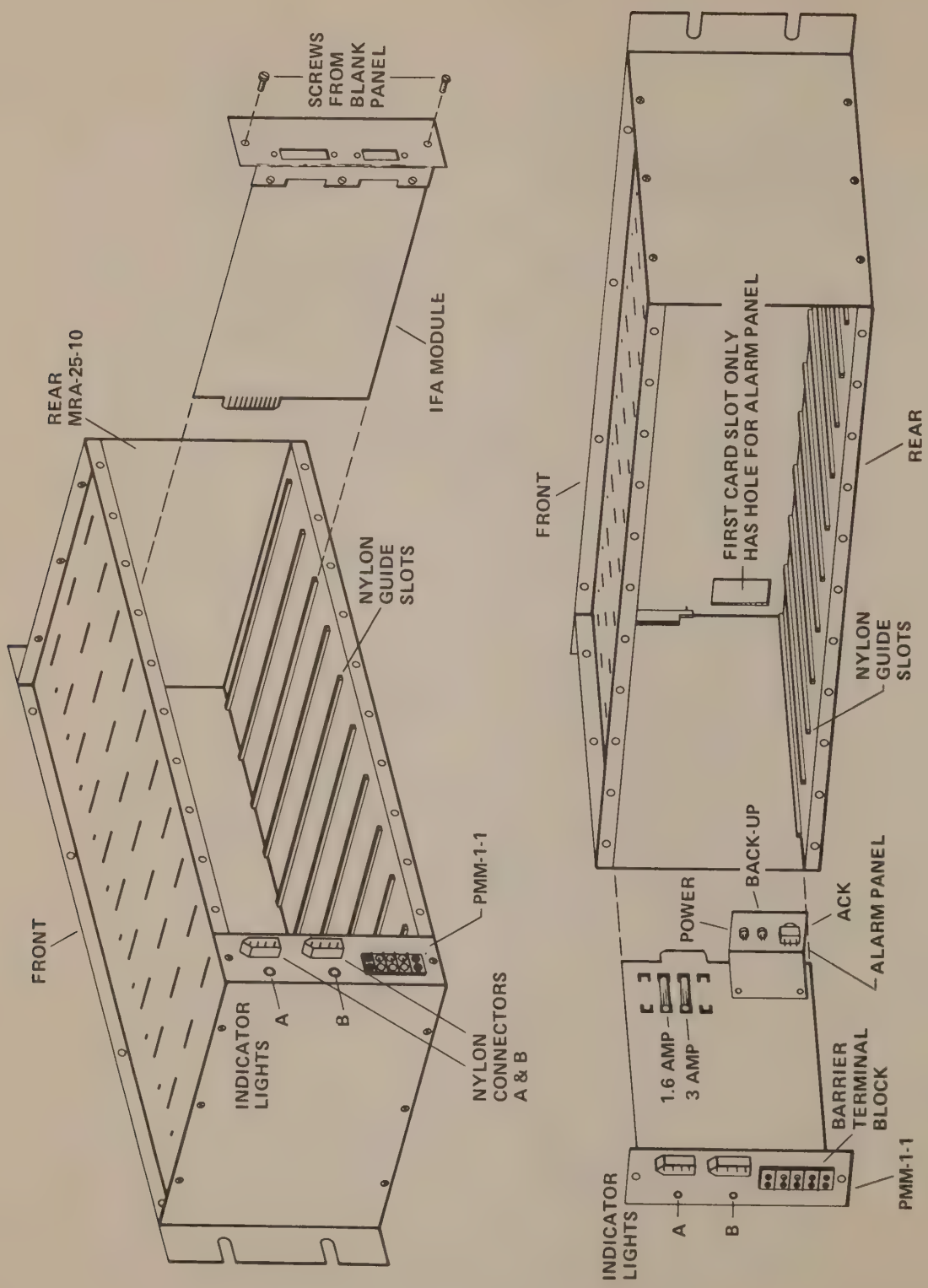


FIGURE 3-6 Rear View: Mounting Rack Assembly, MRA-25-10

3.7 GENERAL INSTALLATION

The rack unit mounts with connections toward the inside rear of the rack equipment enclosure. Modules slide in guides, and faceplates are secured with two No.4 machine screws (see Figure 3-6). The Power Maintenance Module is accessed the same way (see Figure 3-6). Cables from dc power supplies go into nylon connectors A and B (see Figure 3-6). An external alarm circuit may be connected to internal dry contacts by the black barrier terminal block (see Figure 3-6).

1. Mount MRA-25-10 in 19-in. rack at a convenient level so that the lights and ACK button can be easily observed by the operator.

2. Mount the PS-27-1 within reach of the 10-ft cable but in a less valuable space, that is, near the floor or the top of a 7-ft rack, as there are no operator controls on this unit.

3. The Power Maintenance Module, PMM-1, has a strap option. Normally, the buzzer will sound with the flashing lights. The buzzer may be disabled by cutting the printed circuit foil between pads marked BUZZER. Operation of the buzzer may be restored by soldering a short piece of solid wire between pads. Use MRA-25-10 module installation instructions (Section 3.9) to access the Power Maintenance Module.

3.8 PS-27-1

The PS-27-1 is an external dc power supply for the MRA-25-10.

3.8.1 Specifications

Voltage
Dc, from ±15 V at ripple valley to ±25 V peak

Current
Positive 3 A, negative 2 A

Line voltage
105-115 or 220-230 V ac, 50/60 Hz

Power
345 watts, maximum

Voltage tolerance
±10% of selected value

Dimensions
19 in. wide x 5 1/4 in. high x 12 in. deep 48.26
48.26 cm wide x 13.33 cm high x 30.48 cm deep

Weight
21 lb 4 oz (9.64 kg) with dc cables and ac power cord

Fuses
Ac line
105-115 V; 3 A SLO-BLO
220-230 V; 1.5 A SLO-BLO
Positive dc
20 A Standard
Negative dc
10 A Standard

NOTICE: All specifications are subject to change without notice. Units are normally shipped set up for 115-V ac operation.

3.8.2 Installation

CAUTION: Set for correct ac power line voltage before plugging unit in. Install proper fuse for voltage as indicated on chassis.

1. Remove ac power cord from chassis receptacle.

2. Slide clear fuse access window to expose fuse (see Figure 3-7).

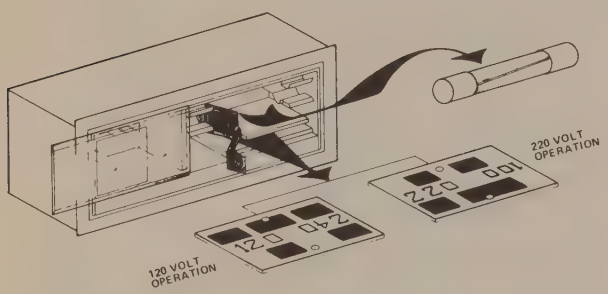


FIGURE 3-7

3. Pull FUSE PULL lever and remove fuse.

4. Remove voltage selector card.

5. Determine the ac line voltage on which the unit must operate. Facing the receptacle, hold the voltage selector card so that the desired voltage range reads right side up. Insert the card in this position.

6. Install the appropriately rated SLO-BLO fuse for the selected voltage. See Specifications, Section 3.8.1, or label on unit. The unit is ready for ac connection. Complete and carefully check dc wiring.

CAUTION: Use only SLO-BLO fuses.

7. Connect dc power cable CA-33-1 to the PS-27-1 by putting the proper spade lug under the matching screws on the barrier strip (see barrier terminal block, Figures 3-1, 3-2). Orange is +15; Black is Signal Ground or common; Yellow is -15; and Green is Frame Ground.

8. Plug the molded nylon connector from the PS-27-1 into the mating A socket on the rear of the MRA-25-10 (see Figure 3-6). This designates PS-27-1 as power supply A. If a second PS-27-1 is to be connected for back-up power, connect it to the B socket using another CA-33-1. Diagnosis will be easier if A supply is always connected to A inputs, and B supply connected to B inputs. Electrically and logically the inputs are alike.

9. If the MRA-25-10 was ordered without modules, or if you wish to add more modules, see Section 3.9 for the procedure on installation of modules, before connecting power.

10. Connect ac power.

11. Observe that the POWER light on the front of the MRA-25-10 is on.

12. Check for data flow.

3.9 INSTALLATION OF MODULES

NOTICE: Any IFA Module can be used in any of the ten module positions in the rack assembly. The Power Maintenance Module must occupy its designated position behind the Alarm Panel cut-out.

1. Remove the two No.4 screws from any blank panel and save the screws.

2. Remove the panel entirely.

CAUTION: Do not store the panel on top of the Mounting Rack Assembly as ventilation holes will be blocked.

3. Slide the module into the opening on nylon guide slots with the circuit board to the left (as you face the rear; see Figure 3-6). Power is applied to the module through the edge connector when the module is completely seated. See individual IFA Module Set-up Instructions, before fastening the module into place.

4. Secure module to rack using the two No.4 screws saved from step 1.

5. Follow individual module instructions for connection of module into data circuit.

6. Observe that the POWER light is ON when power is applied.

7. Check for data flow.

FIGURE 4-1 Rear View: Mounting Rack Assembly, MRA-25-2

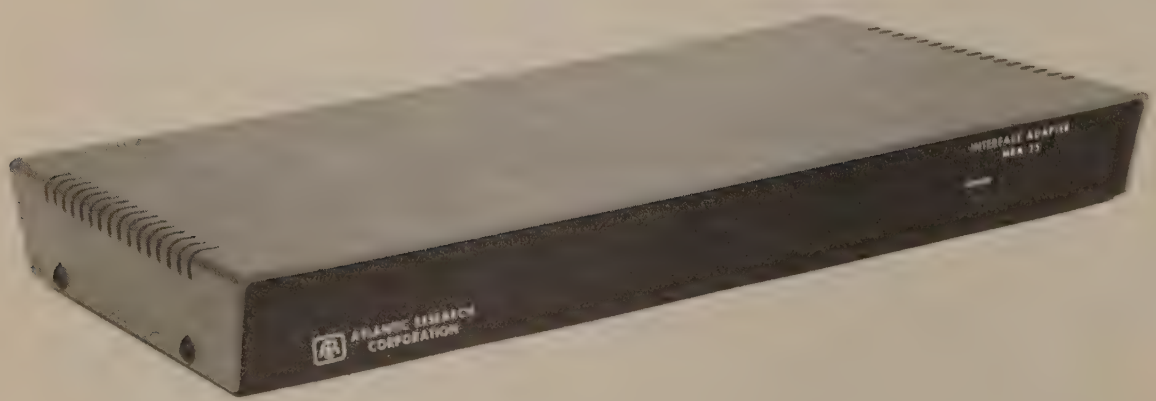


FIGURE 4-2 Front View: Mounting Rack Assembly, MRA-25-2

SECTION 4
MRA-25-2 DESK TOP MOUNT

4.1 DESCRIPTION

The MRA-25-2 is a self-contained unit that houses and provides power for any two IFA Interface Adapter modules. The two modules may be the same model, or two different interface types made by ARC.

All cable connections are on the rear of the cabinet (Figure 4-1). The front (Figure 4-2) has a light to indicate that the power supply is working. The unit mounts on a desk top or in a standard EIA stacked 19-in. rack using the rack mount shelf ARC Model No. SF-1-1. It accepts 50 or 60 Hz power. Voltage (115 or 230 V) is selected by a push-in/slide-out printed circuit card inside the clear panel fuse protector on the rear (Figures 4-3 and 4-4).

CAUTION: Read and follow the installation procedures before connecting power to unit.

4.2 SPECIFICATIONS

Dimensions
- 17 3/4 in. wide x 10 in. deep x 2.1 in. high
- 45.09 cm wide x 25.4 cm deep x 4.45 cm high

Weight
- 5 1b 4 oz (2.38 kg) with two blank panels, including power cord

Power
- U.S. 115 V ac, 60 Hz
- European--230 V ac, 50 Hz
- 60 watts, maximum

Voltage Tolerance
- ±15% of nominal rating

Fuses
- 115 V ac, 1/2 A, SLO-BLO
- 230 V ac Fuse, 1/4 A, SLO-BLO

Finish
- Black grained anodize

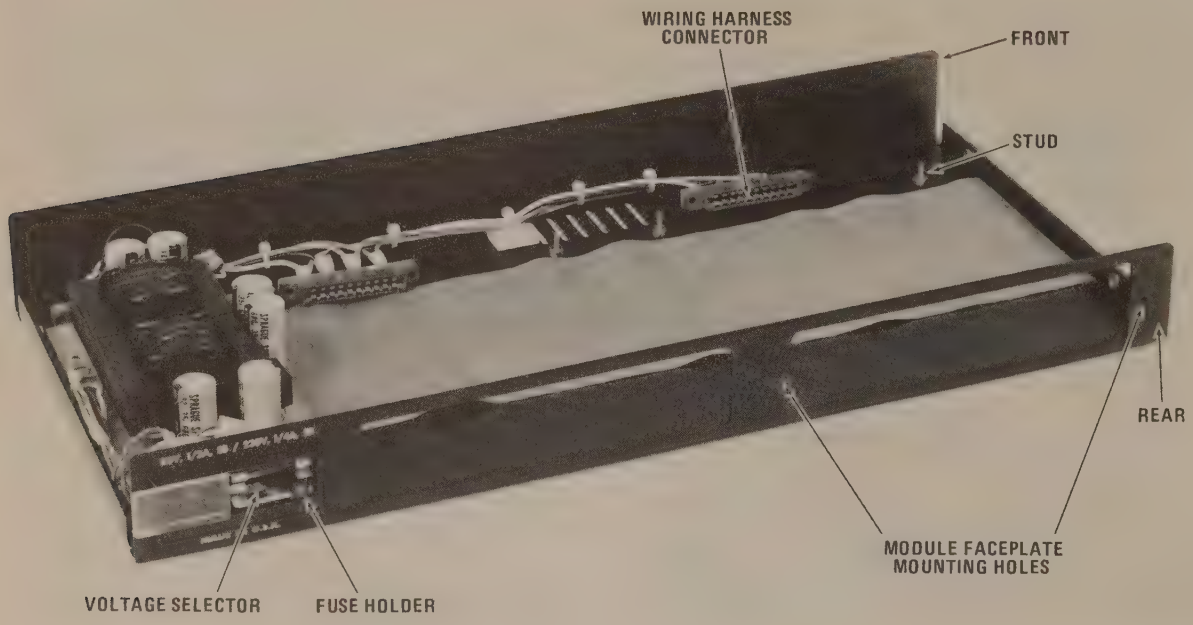


FIGURE 4-3

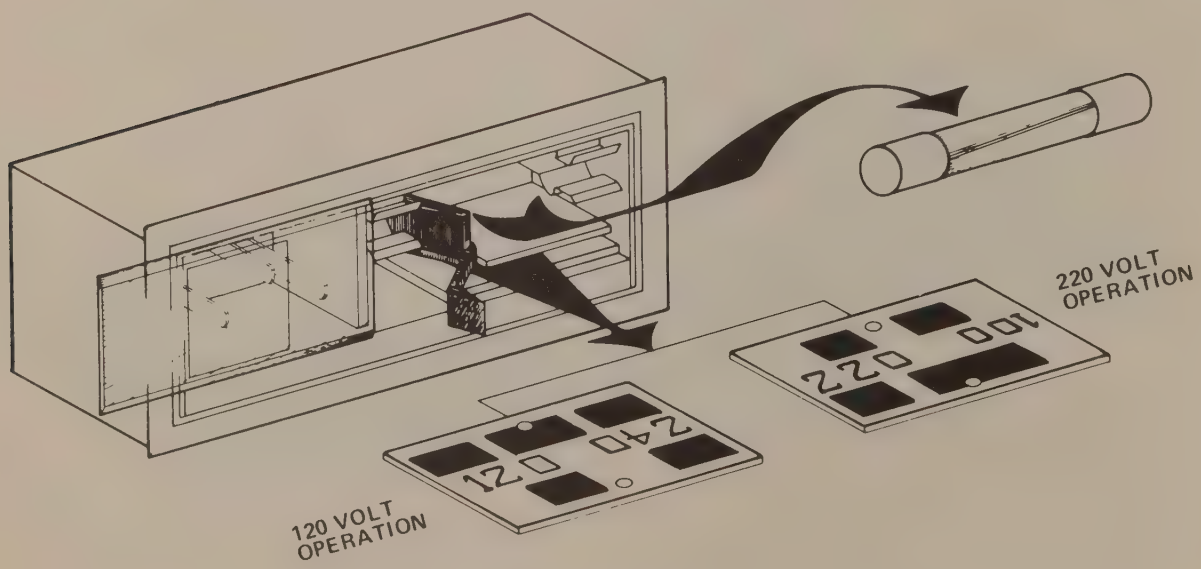


FIGURE 4-4

NOTICE: All specifications are subject to change without notice.

4.3 GENERAL INSTALLATION

CAUTION: Set for correct ac power line voltage before plugging unit in. Install proper fuse for voltage as indicated on chassis.

WARNING: Disconnect the power before removing the blue cover. High voltage is present at ac receptacle and power supply.

To gain access to modules, remove two screws from each end of the blue cover.

4.3.1 MRA-25-2 Installation

Determine the type of power available to the unit. The MRA-25-2 must be set up properly before it is connected to an ac power source; otherwise serious damage may result. See Section 4.2 for voltage choices, then observe the following power set-up procedure.

1. Remove ac cord from chassis receptacle.

2. Slide the clear window to the left (as shown in Figure 4-4).

3. Pull FUSE PULL lever and remove fuse.

4. Remove voltage selector PC card.

5. Hold voltage selector card so that the desired range, either 120 or 220, reads right side up, when you are looking at the MRA-25-2 from the rear. Insert the card. (100 and 240 markings are not used; 100 is the same as 120 and 240 is the same as 220.)

6. Push FUSE PULL lever back into place.

7. Install SLO-BLO fuse of appropriate value determined by specifications (see Section 4.2) or on rear of unit.

CAUTION: Use SLO-BLO fuse only.

8. Install cover before powering up the unit.

9. Reconnect the power cord to the rear point.

CAUTION: MRA-25-2 must be set up properly before it is connected to an ac power source or serious damage may result.

10. Connect the cord to ac power.

11. Observe the red light on the front of the panel.

If the MRA-25-2 was ordered without modules, follow module installation procedure before connecting power. Use reverse procedure for service.

4.3.2 Installation of IFA Module

WARNING: Disconnect the power before removing the blue cover. High voltage is present at ac receptacle and power supply.

Refer to Figure 4-3.

1. Remove the blue cover by removing two screws from each end of the unit. Remove blank panel(s) if so equipped.

2. Lower the IFA module(s) into the MRA with the component side of the board facing up and the two data communications interface connectors extending through the rear panel opening.

3. Slide the wiring harness connector over the circuit board edge connector.

4. Place the holes in the module circuit board over the studs in the chassis.

5. Secure the module face plate bracket to the inside of the rear panel with 4-40 screw, lock washer, and nut (saved from the mounting of the blank panel). Fasten circuit board to studs with 4-40 lock washer and nut.

6. Follow individual module instructions for connection of module into data circuit. Follow set-up instructions before replacing the cover.

7. Repeat for second module if needed.

8. Replace cover.

9. Connect power.

Use reverse procedure for removal of a module.

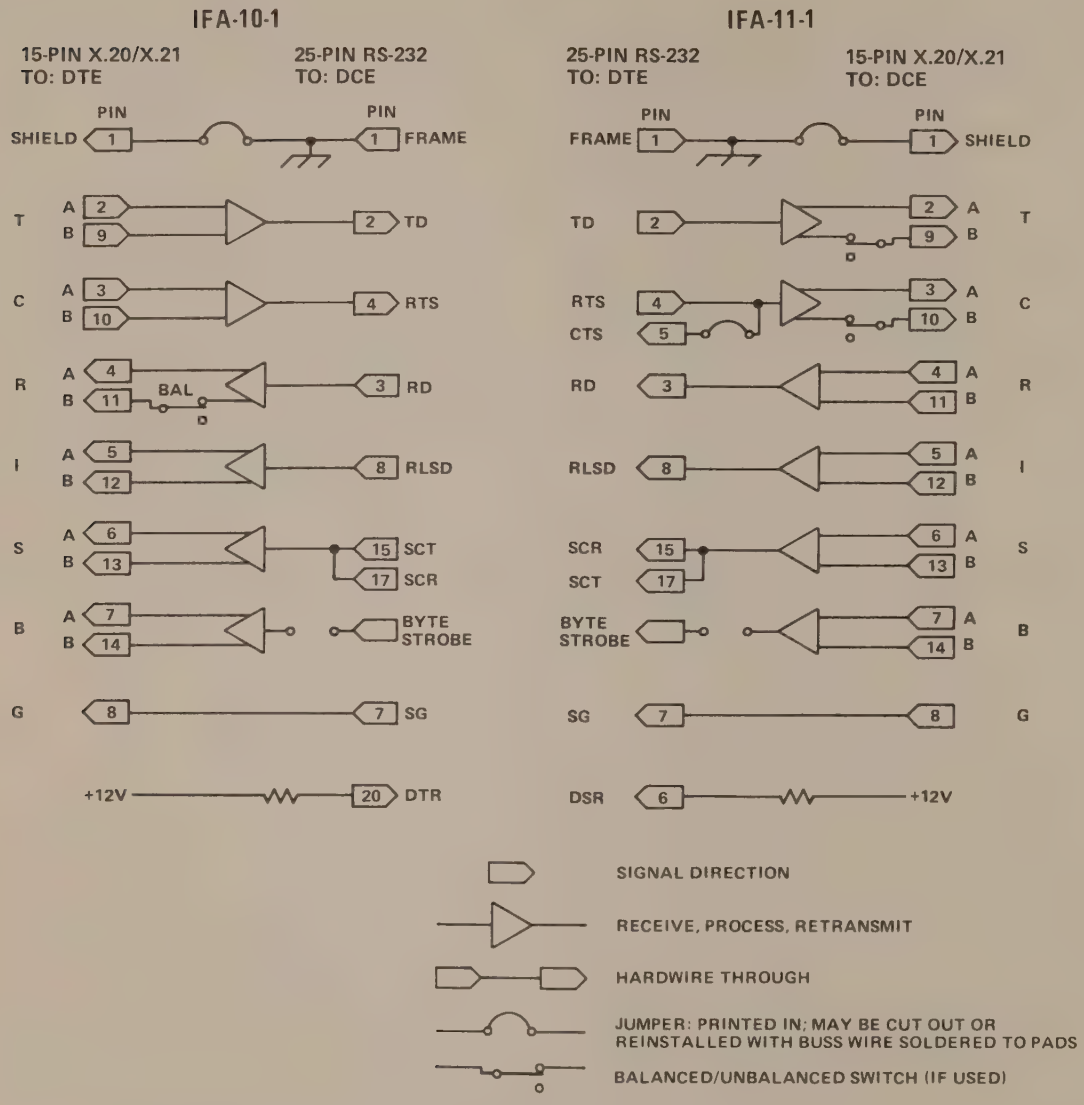


FIGURE 5-1 Signal Conversion Chart: IFA-10 and IFA-11

SECTION 5
X.20/X.21 INTERFACE

5.1 INTRODUCTION

The X.20/X.21 Interface is identified by its 15-pin sub-mini D-type connector. X.21 refers to a standard set defined by the International Telephone and Telegraph Consultative Committee (CCITT) for a general purpose interface between DTE and DCE, for synchronous operation on public data networks. X.20 is asynchronous. This is an international specification which takes advantage of higher speeds made practical by state-of-the-art integrated circuit (IC) technology. Electrically it is based on specifications X.26/RS-422 and X.27/RS-423, balanced and unbalanced respectively.

Even though RS-232/V.24 is only defined below 20 kbps, the IFA-10 and IFA-11 can regenerate signals above 500 kbps. The limiting factor is the loading from the RS-232/V.24 attachment cable and the RS-232/V.24 device.

NOTICE: The IFA-10 and IFA-11 perform electrical signal conversion and do not address the protocol aspects of X.20/X.21. The user must also determine his own requirement for Byte Strobe timing B signal and its equivalent in the RS-232/V.24 interface.

NOTICE X.21 bis is essentially RS-232/V.24 and is considered separately from X.20/X.21.

The IFA-10 converts from an X.20/X.21 DTE to an RS-232/V.24 DCE. The IFA-11 converts from an X.20/X.21 DCE to an RS-232/V.24 DTE.

Beyond solving the obvious mechanical differences between interfaces, the IFAs solve the problems of voltage levels, signal rise times, and grounding.

IFA-10 and IFA-11 comply with the more stringent MIL-STD-188-114, Section 4.4. This specification relates to FED-STD-1020 and -1030, which in turn call out the EIA RS-422 and RS-423, respectively. The parameter values in the MIL-STD-188-114 are identical to the corresponding values in the other specifications with the exception of the (V_{os}) balanced generator offset voltage which is reduced to 0.4 volt, requiring dual power supply voltages of plus and negative polarities for the drivers.

The X.20/X.21 interface adapter module ensures compatibility with other low-level EIA and CCITT standards and with older equipment because it complies with the more stringent subset.

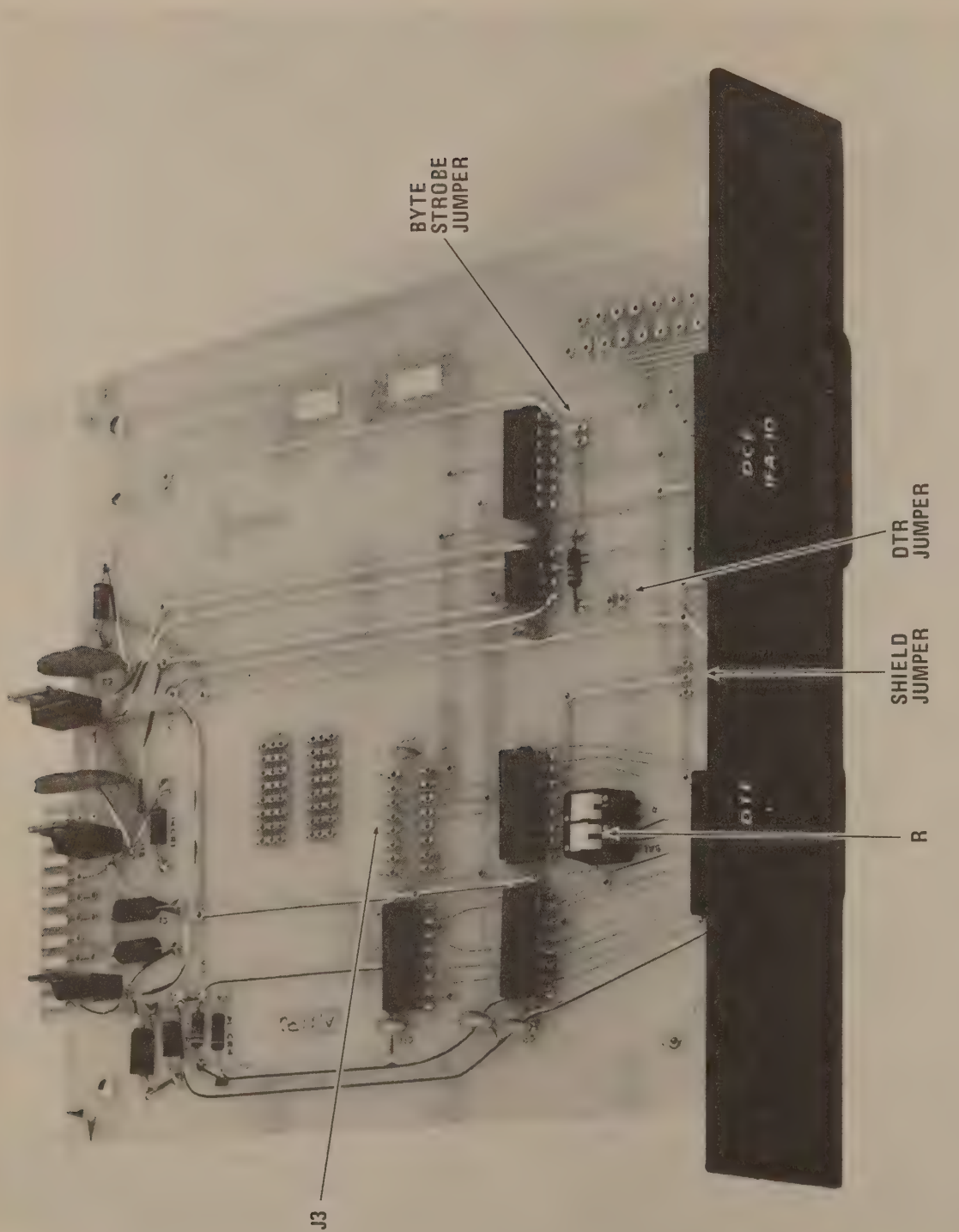


FIGURE 5-2 IFA-10

MIL-STD-188-114 supercedes subparagraph 4.3.1.3 of MIL-STD-188-100 and subparagraph 7.2.1 of MIL-STD-188C. These standards are available from the U.S. Government Printing Office.

Figure 5-1 diagrams the adapter signal flow for IFA-10 and IFA-11.

5.2 IFA-10

The IFA-10 is an interface adapter module which regenerates and converts signals from an X.20/X.21 DTE to an RS-232/V.24 DCE.

5.2.1 Setup

15-pin X.20-X.21 DTE

25-pin RS-232/V.24 DCE

Refer to Figure 5-2.

Using switch S1, signal R may be switched for balanced or unbalanced operation. In unbalanced operation, R(A) pin 4 is polar, and R(B) pin 11 supplies ground for receiver.

Shield jumper may be cut from A to B, and reinstalled A to C, to connect X.20/X.21 interface shield to signal ground instead of frame ground.

Byte strobe input jumper can be cut from F to G, and connected from F to any desired unused pin on the 25-pin connector where it is labeled on the PC board near the connector.

DTR jumper may be cut.

SCT is connected to SCR.

5.2.2 Specifications

Power requirements
+160 mA at +15 V
-110 mA at -15 V

Voltage range
±15 to 25 V dc

Maximum usable data signal rate
Approximately 500 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
X.20/X.21
DA 15-pin female DTE
RS-232/V.24
DB 25-pin male DCE

NOTICE: All specifications are subject to change without notice.

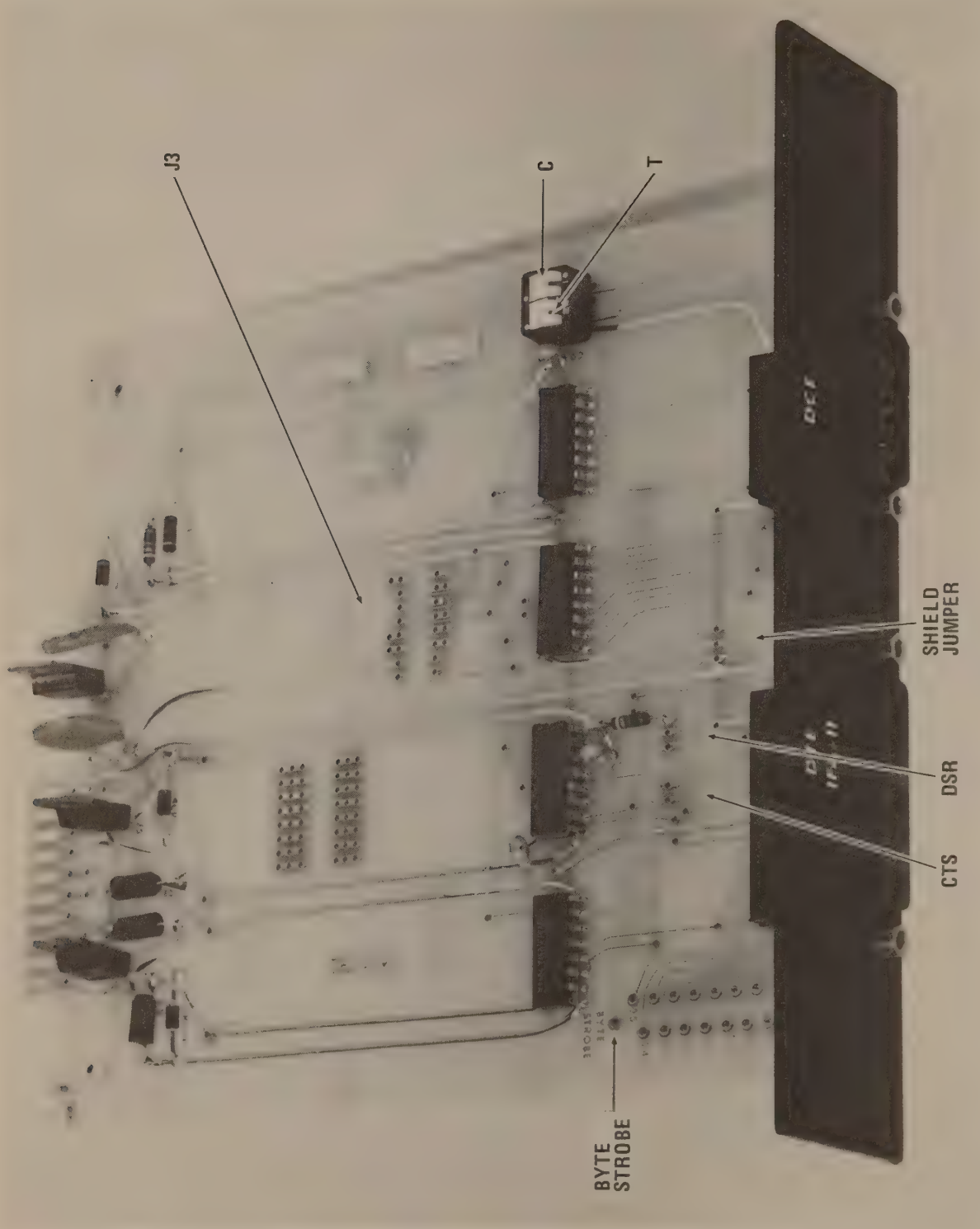


FIGURE 5-3 IFA-11

5.2.3 TTL Test Interface Chart

Table 5-1 is the TTL Test Interface Chart for IFA-10.

The space condition is indicated on the TTL Test Interface (J3) as a TTL LOW shown by 0 in Table 5-1.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 5-1.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

On IFA-10, BYTE STROBE is unassigned to an RS-232/V.24 pin and rests at mark condition.

N.C. means No Connection.

5.3 IFA-11

The IFA-11 is an interface adapter module which regenerates and converts signals from an X.20/X.21 DCE to an RS-232/V.24 DTE.

5.3.1 Setup

15-pin X.20/X.21 DCE

25-pin RS-232/V.24 DTE

Refer to Figure 5-3.

Signals T and C may be switched for balanced or unbalanced operation. In unbalanced operation, the A leads, pins 2 and 3, are bipolar and the B leads, pins 9 and 10, supply ground for the receiver.

Shield jumper may be cut from A to B and replaced B to C to connect the shield to signal ground instead of frame ground.

Byte Strobe output may be connected to any desired unused pin on the 25-pin connector where it is labeled on the PC board near the connector.

CTS and DSR jumpers may be cut.

SCT is connected to SCR.

5.3.2 Specifications

Power requirements
+90 mA at +15 V
-30 mA at -15 V

Voltage range
±15 to 25 V dc

Maximum usable data signal rate
Approximately 500 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

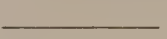
Panel Dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
X.20/X.21
DA 15-pin male DCE

RS-232/V.24
DB 25-pin female DTE

NOTICE: All specifications are subject to change without notice.

TABLE 5-1
TTL TEST INTERFACE (J3) CHART FOR IFA-10

Pin	Signal Name	Signal	Signal	Signal Name	Pin
1		N.C.	M + S 0 	BYTE STROBE	16
2	TD	M + S 0	N.C.		15
3	RD	M + S 0	M +5	V_{cc}	14
4	RTS	M + S 0	N.C.		13
5		N.C.	N.C.		12
6		N.C.	N.C.		11
7	SG	M + S 0	M + S 0	SCT	10
8	RLSD	M + S 0	M + S 0	SCR	9

5.3.3 TTL Test Interface Chart

Table 5-2 is the TTL Test Interface Chart for IFA-11.

The space condition is indicated on the TTL Test Interface (J3) as a TTL LOW shown by 0 in Table 5-2.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 5-2.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

On IFA-11, BYTE STROBE is unassigned to an RS-232/V.24 pin and resets at mark condition.

N.C. means No Connection.

TABLE 5-2
TTL TEST INTERFACE (J3) CHART FOR IFA-11

Pin	Signal Name	Signal	Signal	Signal Name	Pin
1		N.C.	M + S 0	BYTE STROBE	16
2	TD	M + S 0	N.C.		15
3	RD	M + S 0	M +5	V_{cc}	14
4	RTS	M + S 0	N.C.		13
5		N.C.	N.C.		12
6		N.C.	N.C.		11
7	SG	M + S 0	M + S 0	SCT	10
8	RLSD	M + S 0	M + S 0	SCR	9

SECTION 6
RS-449 INTERFACE

6.1 INTRODUCTION

The RS-449 Interface is identified by the 37-pin standard sub-mini D-type connector. A 9-pin sub-mini D-type connector carrying secondary signals may be present (see Figure 6-2). A proposed feature is the use of quick release spring clip locks instead of the normal screw locks. RS-449 refers to a standard proposed by EIA for the U.S.A. as a general purpose interface between DTE and DCE. Electrically it is based on two specifications, X.26/RS-422 and X.27/RS-423, balanced and unbalanced respectively, and is intended to replace RS-232C/V.24, now in common use. This will allow higher data signaling rates, made possible by state-of-the-art IC technology, with better cross-talk rejection over longer cable distances between equipment.

Beyond solving the obvious mechanical differences between RS-232/V.24 and RS-449, the IFAs solve problems of voltage levels, signal rise times, and grounding.

The ARC adapter models for this interface are the following:

IFA-12 for an RS-449 DTE to an RS-232/V.24 DCE.

IFA-13 for an RS-449 DCE to an RS-232/V.24 DTE.

The -1 after the model number denotes the 37-pin connector only; -2 means that the 9-pin connector with the secondary signals is also included. Operating RS-232/V.24 (old equipment) above 20 kbps may impose a shorter cable length for reliable operation. Normal maximum cable length for RS-232/V.24 is 50 ft according to the specifications.

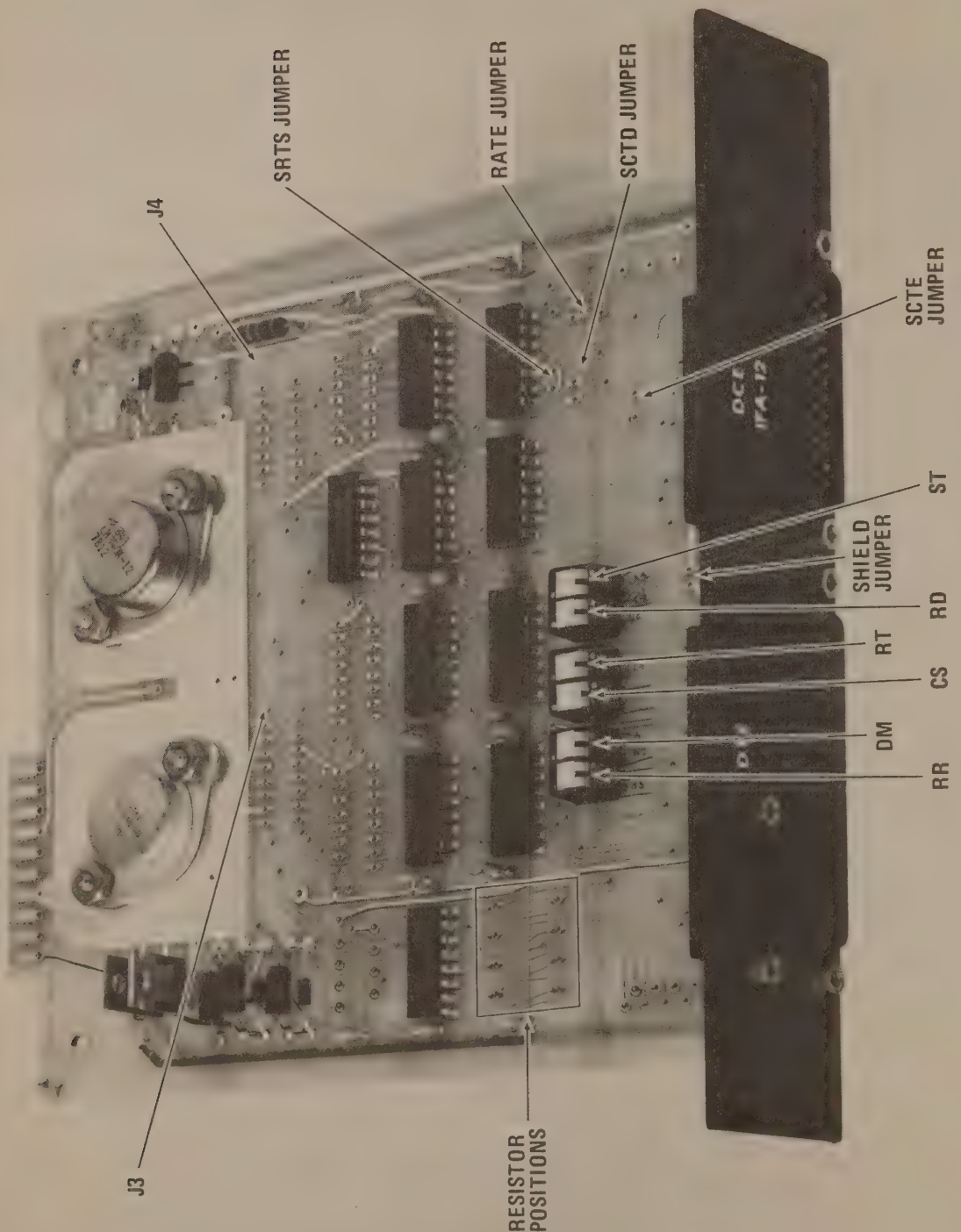


FIGURE 6-1 IFA-12

The limiting factor is the loading from the RS-232/V.24 attachment cable and the RS-232/V.24 device.

IFA-12 and IFA-13 comply with the more stringent MIL-STD-188-114, Section 4.4. This specification relates to FED-STD-1020 and -1030, which in turn call out the EIA RS-422 and RS-423, respectively. The parameter values in the MIL-188-114 are identical to the corresponding values in other specifications with the exception of the (V_{os}) balanced generator offset voltage which is reduced to 0.4 volt, requiring dual power supply voltages of plus and negative polarities for the drivers.

The RS-449 interface adapter module ensures compatibility with other low-level EIA and CCITT standards and with older equipment because they comply with the more stringent subset.

MIL-STD-188-114 supersedes subparagraph 4.3.1.3 of MIL-STD-188-100 and subparagraph 7.2.1 of MIL-STD-188C. These standards are available from the U.S. Government Printing Office.

Figure 6-3 diagrams the adapter signal flow for IFA-12 and IFA-13.

6.2 IFA-12

The IFA-12 is an interface adapter module which converts signals from an RS-449 DTE to an RS-232/V.24 DCE.

6.2.1 Setup

37-pin/9-pin RS-449 DTE

25-pin RS-232/V.24 DCE

Refer to Figures 6-1 and 6-2.

The Class I signal drivers have switches to program the signals for balanced or unbalanced operation. There are six switches on the IFA-12 for signals ST, RD, RT, CS, DM, and RR. Balanced operation is preferred where the DTE may receive balanced signals. These signals are defined as balanced if they are above 20 kbps.

In unbalanced operation, shield jumper may be installed from A to B.

The SI jumper, or RATE jumper, may be cut from F to E and reinstalled at E to G.

SCTE, SCTD, SRTS jumpers may be cut if these signals are not used.

The circuit board layout provides for 4-kohm resistors to be added across differential receiver inputs, if needed, above 20 kbps. This applies for the Class I circuit signals: SD, RS, TR, TT. Labels for resistor positions are etched into the PC board.

6.2.2 Specifications

Power requirements
+270 mA at +15 V
-130 mA at -15 V

Voltage range
±15 to 5 V dc

Maximum usable data signal rate
Approximately 500 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
RS-449
dc 37-pin female DTE with
optional DE 9-pin female DTE
RS-232/V.24
DB 25-pin male DCE

NOTICE: All specifications are subject to change without notice.

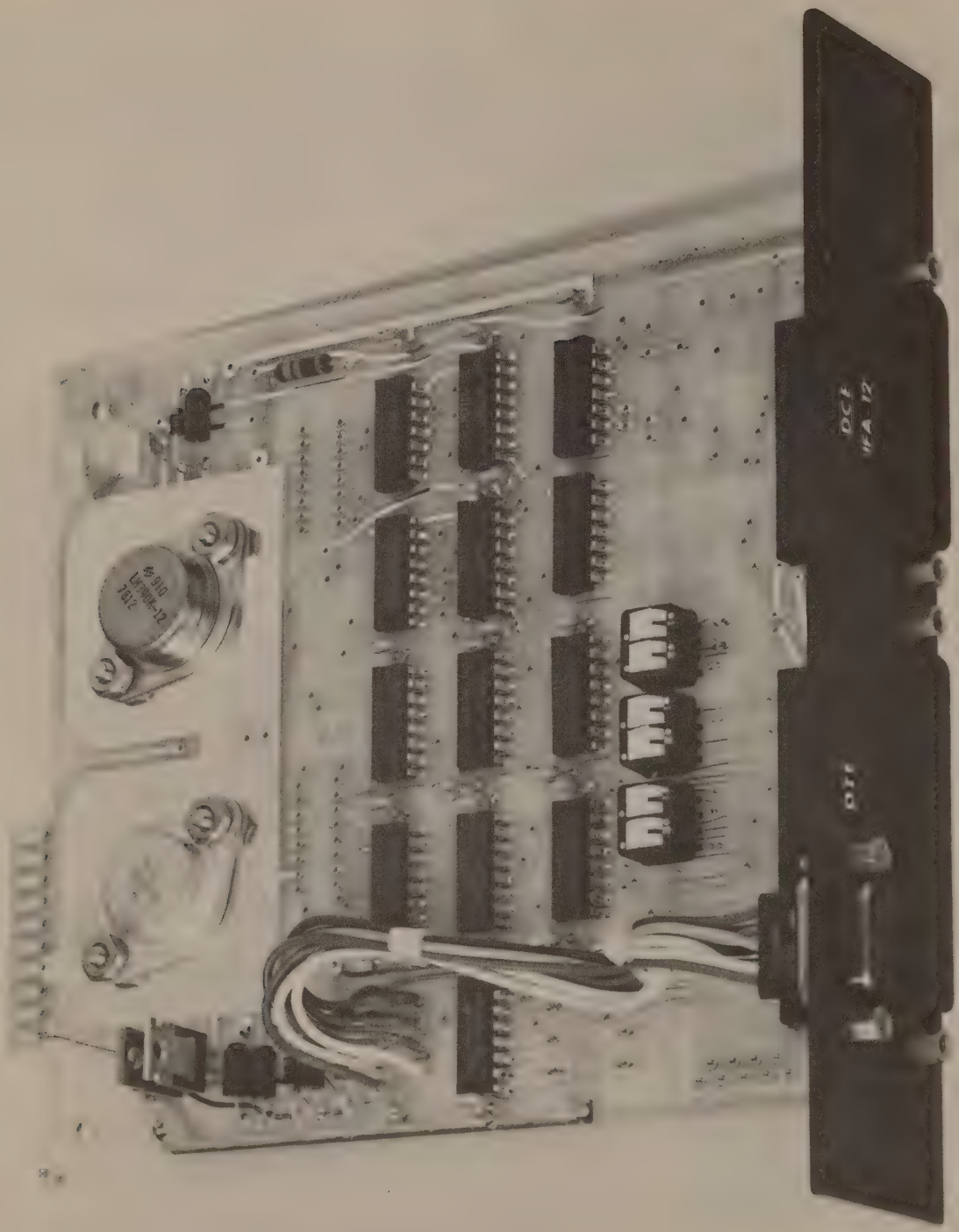


FIGURE 6-2 IFA-12-2

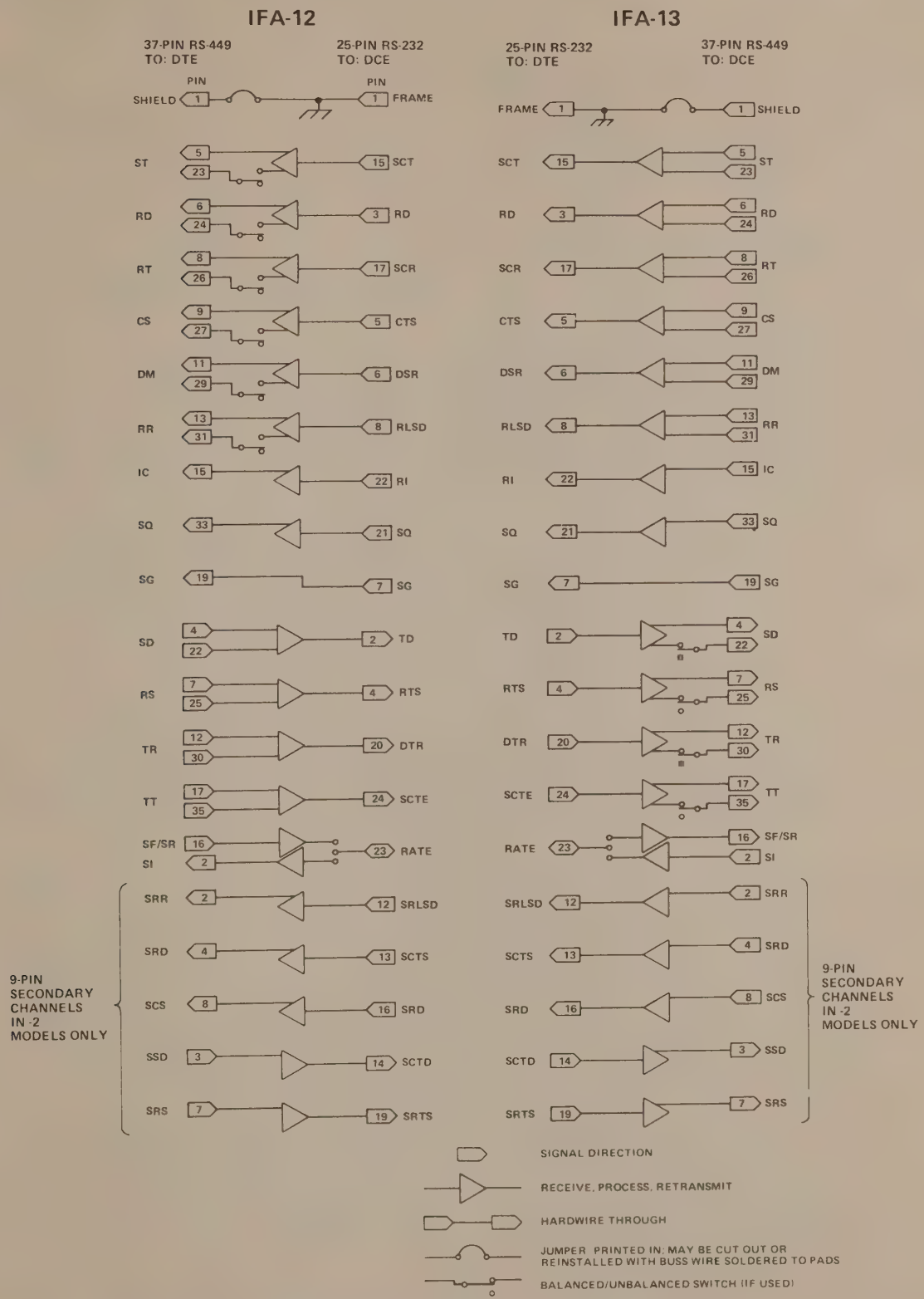
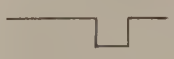
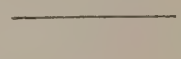


FIGURE 6-3 Signal Conversion Chart: IFA-12 and IFA-13

TABLE 6-1
TTL TEST INTERFACE CHART FOR IFA-12

Pin	Signal Name	Signal	Signal	Signal Name	Pin
		J3			
1		N.C.	M + / S 0	RATE: SF/SR to DCE	16
2	TD	M + / S 0	M + / S 0 	SQ	15
3	RD	M + / S 0	M +	V_{cc}	14
4	RTS	M + / S 0	M + / S 0	SCTE	13
5	CTS	M + / S 0	M + / S 0	RI	12
6	DSR	M + / S 0	M + / S 0	DTR	11
7	SG	S 0	M + / S 0	SCR	10
8	RLSD	M + / S 0	M + / S 0	SCT	9
		J4			
2	SCTD	M + / S 0	M +	SPARE	16
3	SRD	M + / S 0	M + / S 0 	OPTIONAL RATE: SI TO DTE	14
4	SRTS	M + / S 0			
5	SCTS	M + / S 0			
8	SRLSD	M + / S 0			

6.2.3 TTL Test Interface Chart

Table 6-1 is the TTL Test Interface Chart for IFA-12.

The space condition is indicated on the TTL Test Interface (J3 and J4) as a TTL LOW shown by 0 in Table 6-1.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 6-1.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

On IFA-12, the optional rate line will rest at mark conditioning as will the spare channel.

N.C. means No Connection.

6.3 IFA-13

The IFA-13 is an interface adapter module which converts signals from an RS-449 DCE to an RS-232/V.24 DTE.

6.3.1 Setup

37-pin/9-pin RS-449 DCE 25-pin RS-232/V.24 DTE

Refer to Figures 6-4 and 6-5.

The Class I signal drivers have switches to program those signals for balanced or unbalanced operation. There are four switches on the IFA-13 for signals SD, RS, TR, TT. Balanced operation is preferred where the DCE may receive balanced signals. These signals are defined as balanced above 20 kbps.

In unbalanced operation, shield jumper may be installed from A to B.

SF/SR may be cut and RATE jumper may be cut from E to F and reinstalled E to G to reverse RATE signal.

SRLSD, SCTS, SRD jumpers may be cut if these RS-232/V.24 signals are not used.

The circuit board layout provides for 4-kohm resistors to be added across differential receiver inputs if needed above 20 kbps. This applies to Class I circuits: ST, RD, RT, CS, DM, RR. Labels for resistor positions are etched on the PC board.

6.3.2 Specifications

Power requirements
+260 mA at +15 V
-50 mA at -15 V

Voltage range
±15 to 25 V dc

Maximum usable data signal rate
Approximately 500 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
RS-449
dc 37-pin male DCE with
optional DE 9-pin male DCE

RS-232/V.24
DB 25-pin female DTE

NOTICE: All specifications are subject to change without notice.

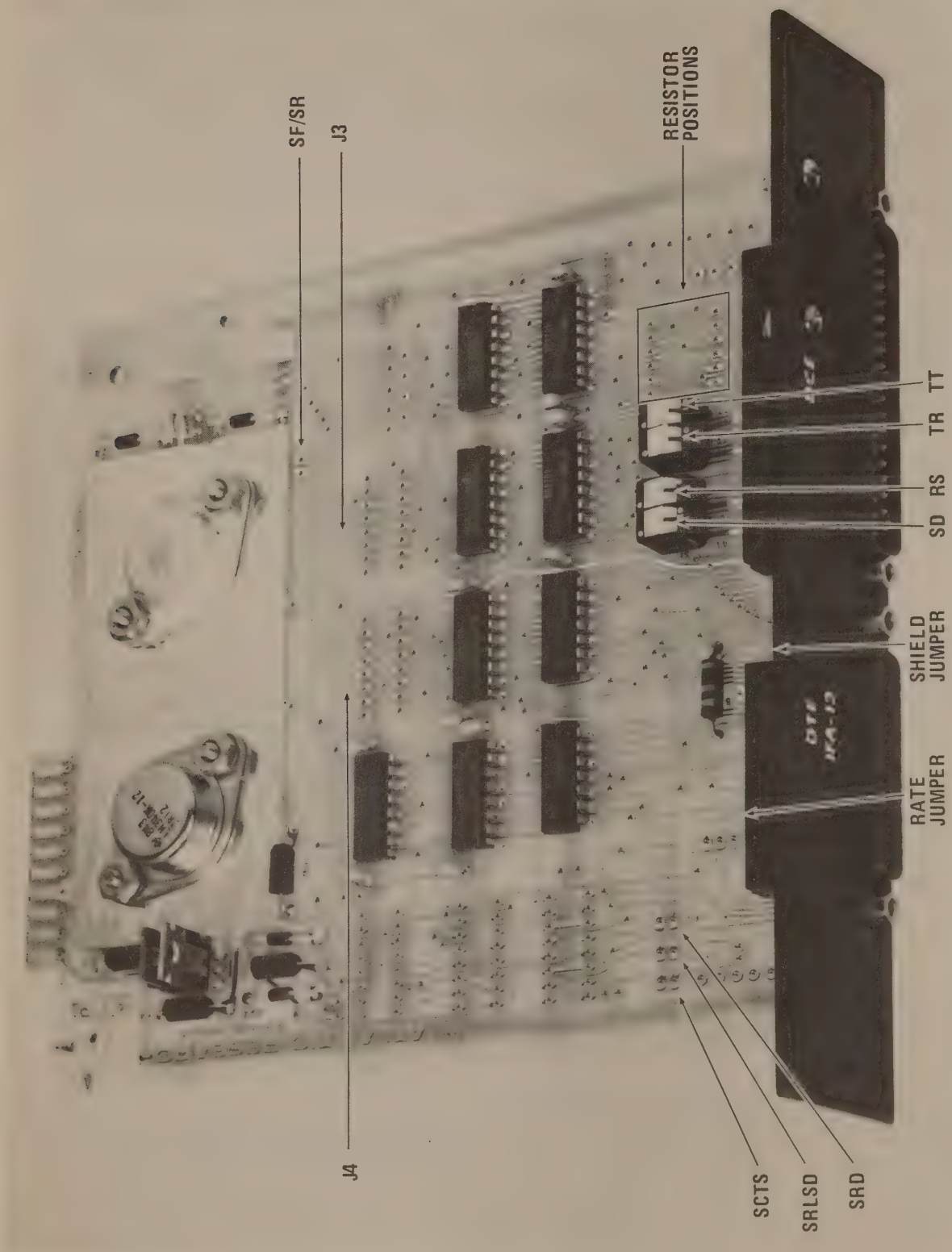


FIGURE 6-4 IFA-13

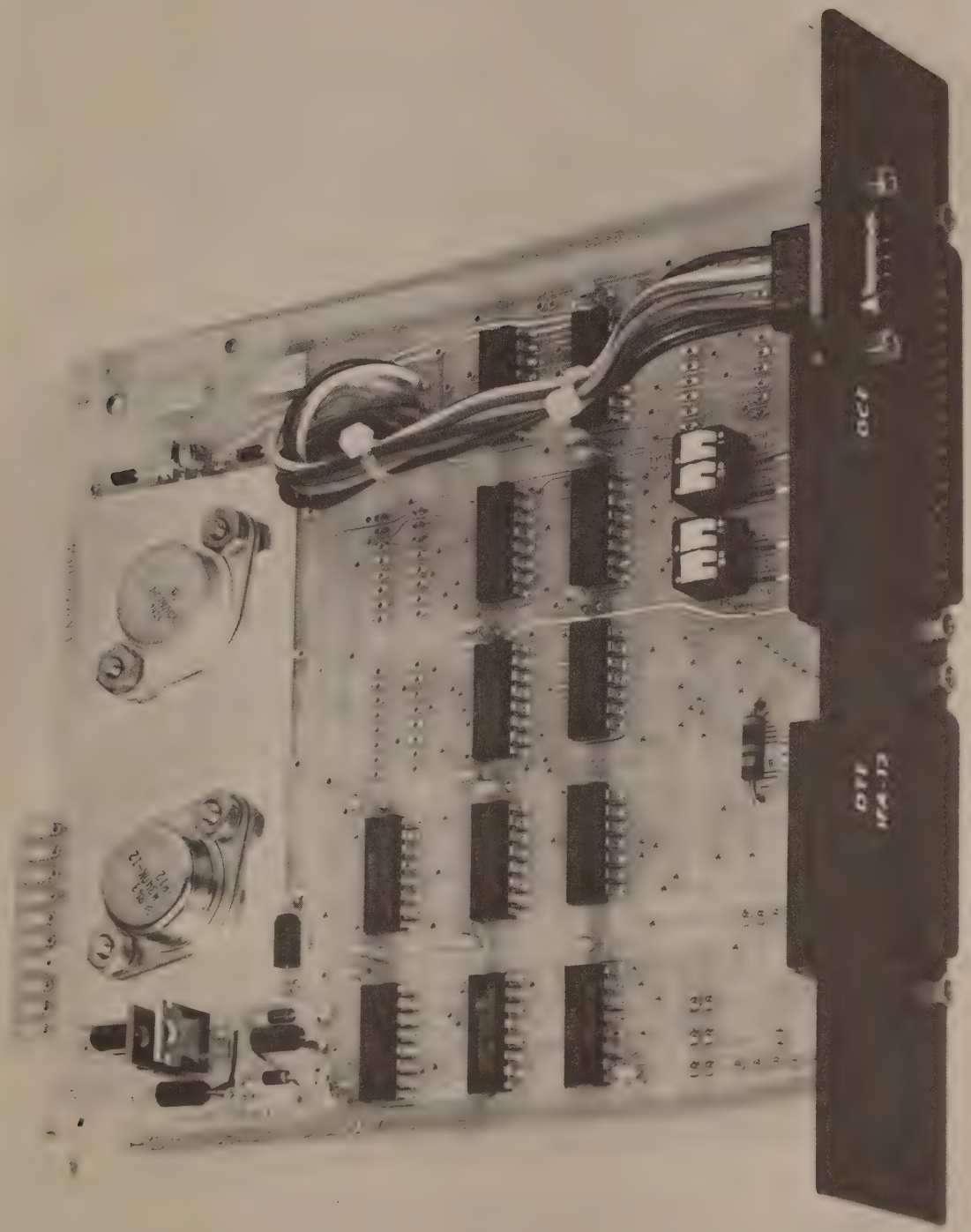
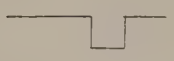
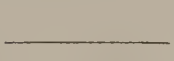


FIGURE 6-5 IFA-13-2

TABLE 6-2
TTL TEST INTERFACE CHART FOR IFA-13

Pin	Signal Name	Signal	Signal	Signal Name	Pin
		J3			
1		N.C.	M + / S 0	RATE: SF/SR to DCE	16
2	TD	M + / S 0	M + / S 0	SQ	15
3	RD	M + / S 0	M +	V_{cc}	14
4	RTS	M + / S 0	M + / S 0	SCTE	13
5	CTS	M + / S 0 	M + / S 0	RI	12
6	DSR	M + / S 0	M + / S 0	DTR	11
7	SG	S 0 	M + / S 0	SCR	10
8	RSLD	M + / S 0	M + / S 0	SCT	9
		J4			
2	SCTD	M + / S 0	M +	SPARE	16
3	SRD	M + / S 0	M + / S 0	OPTIONAL RATE: SI TO DTE	14
4	SRTS	M + / S 0			
5	SCTS	M + / S 0			
8	SRLSD	M + / S 0			

6.3.3 TTL Test Interface Chart

Table 6-2 is the TTL Test Interface Chart for IFA-13.

The space condition is indicated on the TTL Test Interface (J3 and J4) as a TTL LOW shown by 0 in Table 6-2.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 6-2.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

On IFA-13, the optional rate line will rest at mark conditioning as will the spare channel.

N.C. means No Connection.

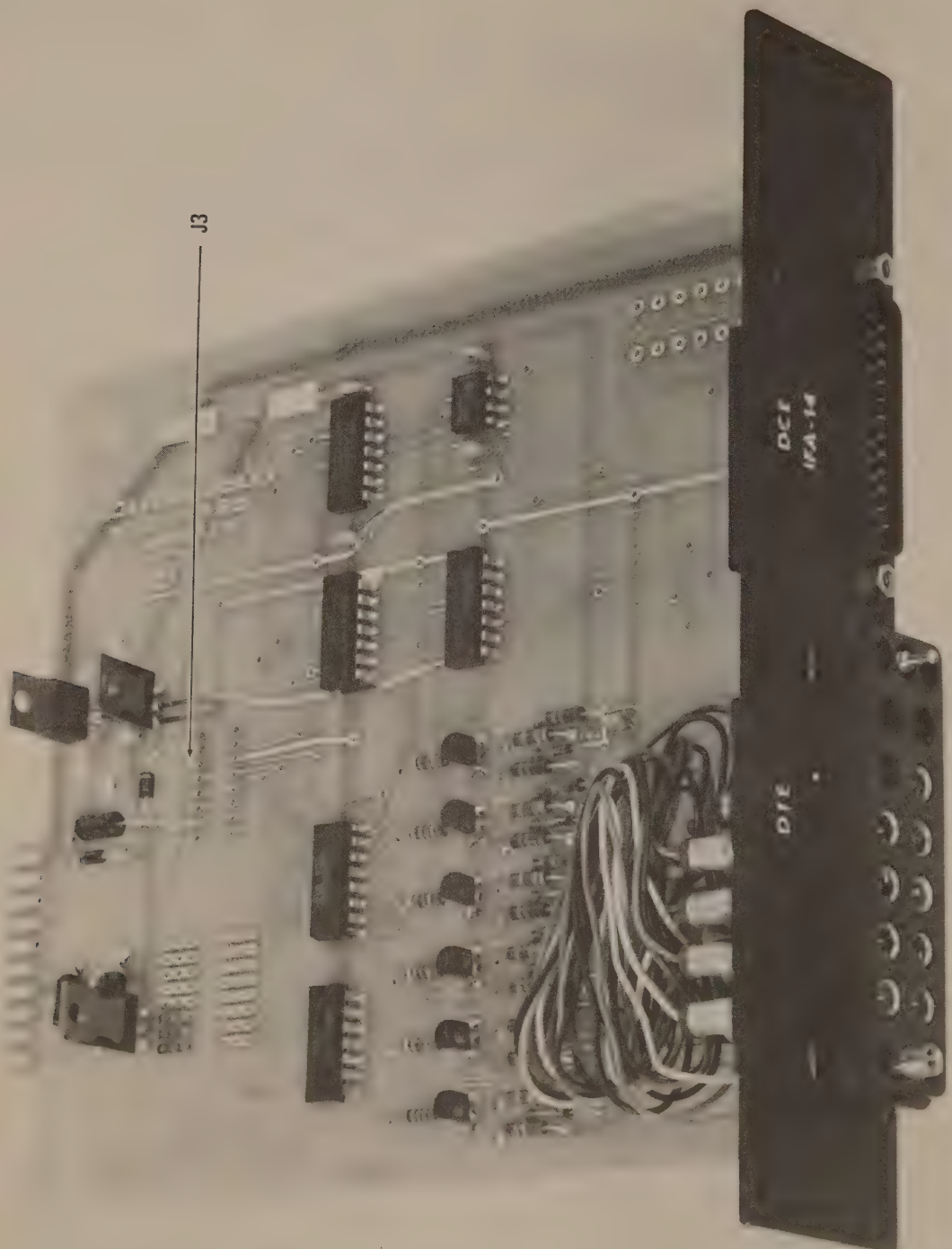


FIGURE 7-1 IFA-14

SECTION 7
BELL 303 INTERFACE

7.1 INTRODUCTION

The Bell 303 Interface may be recognized by the Burndy MD12 MXR connector on the data set, and by the MD12 MXP plug on the business machine cable. The connectors are 12-lettered-position coaxial with only 9 positions used. (Notice that the plug is the male connector, as designated by the outer coaxial connection.) Bell 303 refers to the technical reference for wideband data stations, 303 type, August 1966, copyright AT&T. We are concerned with the mechanical and electrical description of the interface between the DTE and DCE.

Because of the mechanical and electrical incompatibility, an adapter or adapters are needed to connect one type of equipment to the other or to patch Bell 303 using popular RS-232/V.24 patching, monitoring, and active test equipment, such as the Atlantic Research INTERVIEW product line.

The IFA adapter modules designed for Bell 303 conversion are as follows:

IFA-14 (Figure 7-1) converts Bell 303 DTE to an RS-232/V.24 DCE.

IFA-15-1 (Figure 7-2) converts Bell 303 DCE to an RS-232/V.24 DTE using a stub cable and male connector (Figure 7-3).

IFA-15-2 has a chassis-mounted female connector (Figure 7-3) instead of the cable.

The stub cable standard length is 2 ft but lengths up to 50 ft are available on request. The cable ordered alone is CA-17-1-L, where -L is the length in feet.

NOTICE: This is not coaxial so data integrity may suffer at high speeds and long lengths.

EIA RS-232C is defined below 20 kbps but the Bell 303 Interface will also work at 230.4 kbps. The IFA module adapters are designed to regenerate good waveforms at 500 kbps. Running RS-232/V.24 equipment at such data rates may impose a limitation on the RS-232/V.24 interface cable lengths for reliable operation. The limiting factor is the loading from the RS-232/V.24 attachment cable and the RS-232/V.24 device.

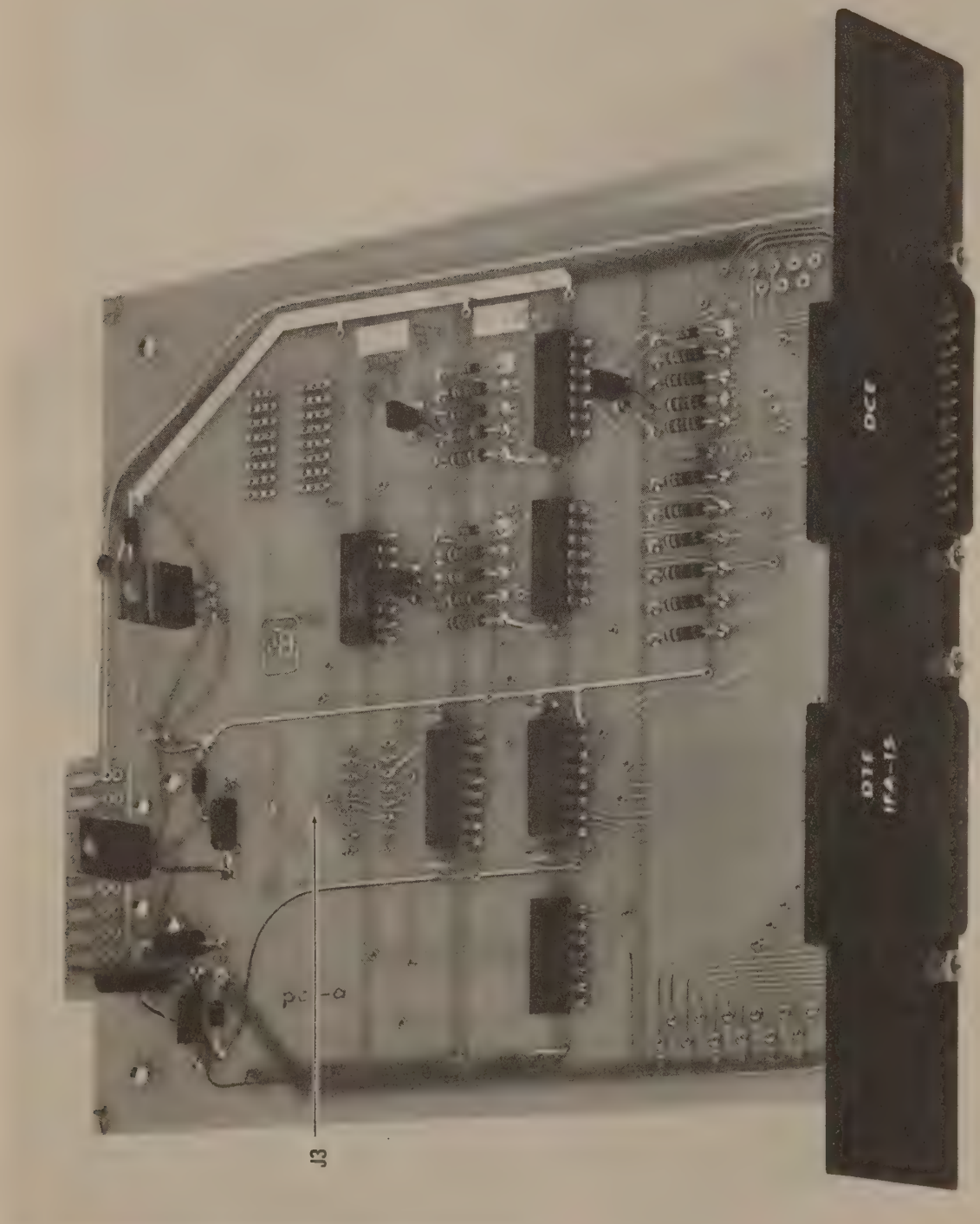


FIGURE 7-2 IFA-15-1

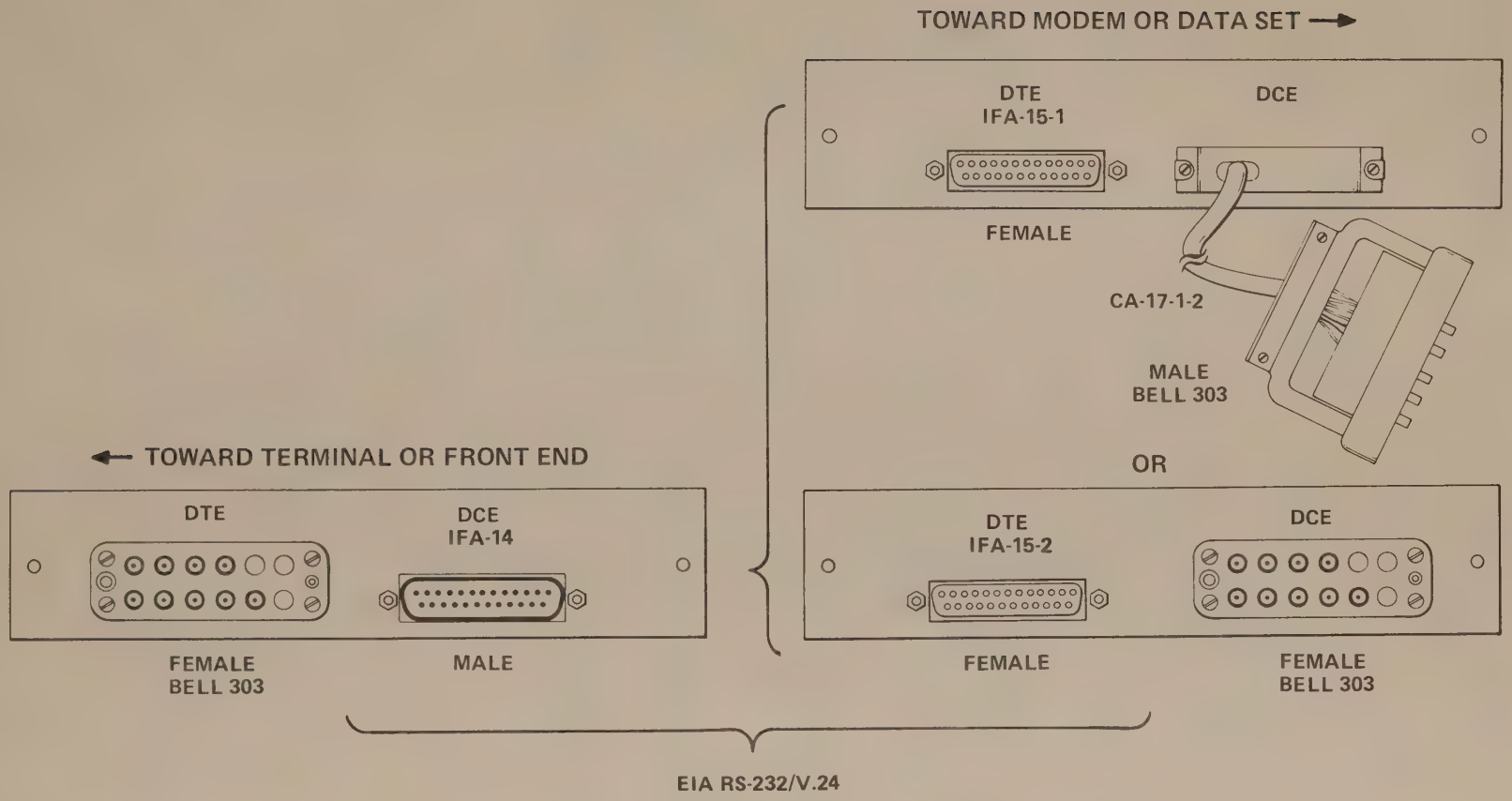


FIGURE 7-3 IFA-15-2

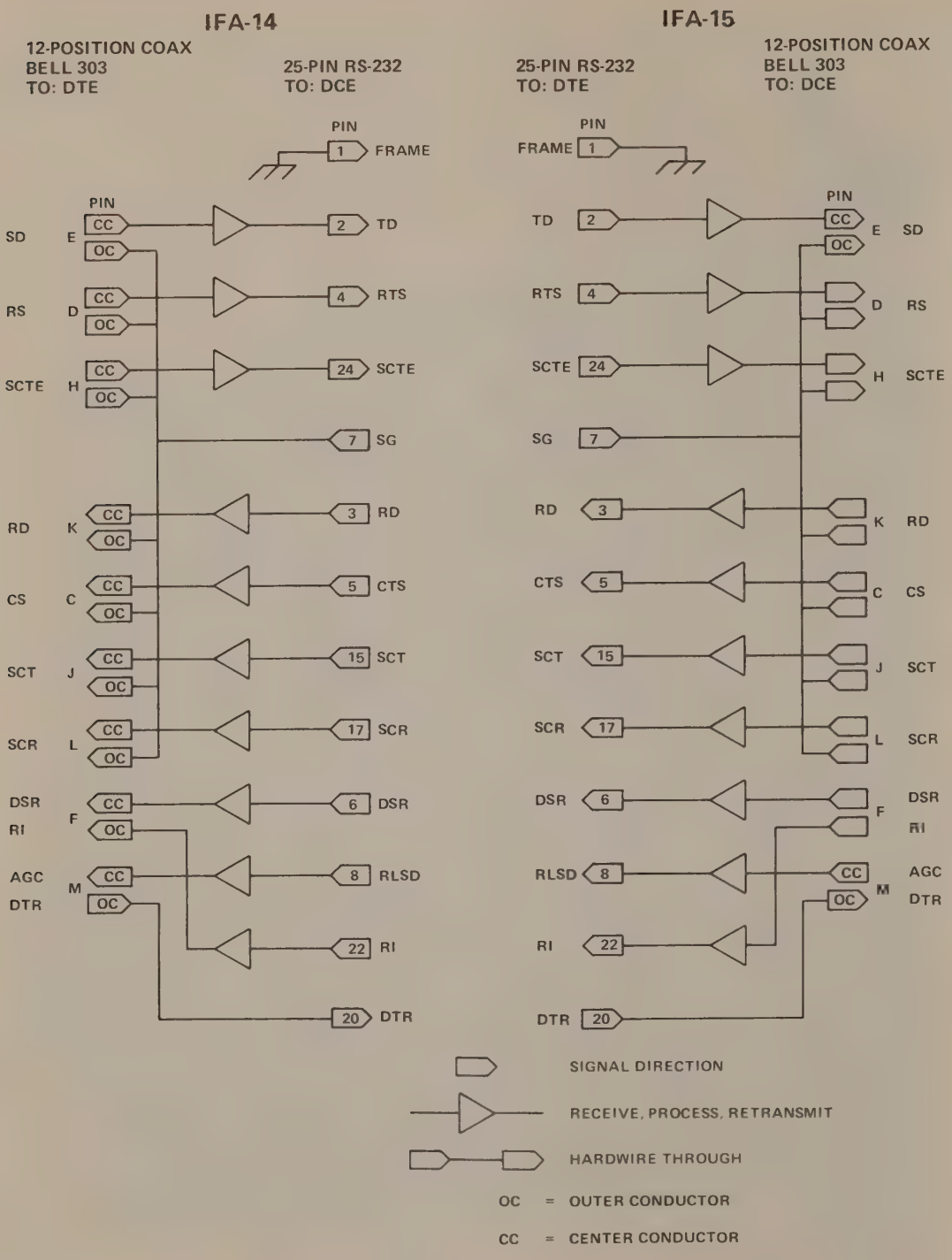


FIGURE 7-4 Signal Conversion Chart: IFA-14 and IFA-15

Figure 7-4 diagrams the adapter signal flow for IFA-14 and IFA-15.

7.2 IFA-14

The IFA-14 is an interface adapter module which converts signals from Bell 303 DTE to an RS-232/V.24 DCE.

7.2.1 Specifications

Power requirements
+110 mA at +15 V
-20 mA at -15 V

Voltage range
±15 to 25 V dc

Maximum usable data signal rate
Approximately 500 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
Bell 303
12-position coaxial female DTE
RS-232/V.24
25-pin male DCE

NOTICE: All specifications are subject to change without notice.

7.2.2 TTL Test Interface Chart

Table 7-1 is the TTL Test Interface Chart for IFA-14.

The space condition is indicated on the TTL Test Interface (J3) as a TTL LOW shown by 0 in Table 7-1.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 7-1.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

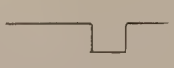
N. C. means No Connection.

7.3 IFA-15

The IFA-15 is an interface adapter module which converts signals from Bell 303 DCE to an RS-232/V.24 DTE.

The IFA-15-1 uses a stub cable and Bell 303 male connector (Figure 7-3).

TABLE 7-1
TTL TEST INTERFACE (J3) CHART FOR IFA-14

Pin	Signal Name	Signal	Signal	Signal Name	Pin
1		N.C.	N.C.		16
2	TD	M + S 0	N.C.		15
3	RD	M + S 0	M +	V_{cc}	14
4	RTS	M + S 0	M + S 0	SCTE	13
5	CTS	M + S 0	M + S 0	RI	12
6	DSR	M + S 0	M + S 0	DTR	11
7	SG	S 0	M + S 0	SCR	10
8	RLSD	M + S 0	M + S 0 	SCT	9

The IFA-15-2 has a chassis-mounted Bell 303 female connector (Figure 7-3) instead of the cable.

7.3.1 Specifications

Power requirements
+50 mA at +15 V
-20 mA at -15 V

Voltage Range
±15 to 25 V dc

Maximum usable data signal rate
Approximately 500 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
RS-232/V.24
25-pin female DTE
Bell 303
25-pin male DCE
needs cable with
12-position coaxial male

NOTICE: Exception: IFA-15-2

Panel connectors
RS-232/V.24
25-pin female DTE
Bell 303
12-position coaxial female DCE

NOTICE: All specifications are subject to change without notice.

7.3.2 TTL Test Interface Chart

Table 7-2 is the TTL Test Interface Chart for IFA-15.

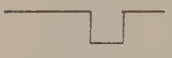
The space condition is indicated on the TTL Test Interface (J3) as a TTL LOW shown by 0 in Table 7-2.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 7-2.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

N.C. means No Connection.

TABLE 7-2
TTL TEST INTERFACE (J3) CHART FOR IFA-15

Pin	Signal Name	Signal	Signal	Signal Name	Pin
1		N.C.	N.C.		16
2	TD	M + S 0	N.C.		15
3	RD	M + S 0	M +	V_{cc}	14
4	RTS	M + S 0	M + S 0	SCTE	13
5	CTS	M + S 0 	M + S 0	RI	12
6	DSR	M + S 0	M + S 0	DTR	11
7	SG	S 0	M + S 0	SCR	10
8	RLSD	M + S 0	M + S 0	SCT	9

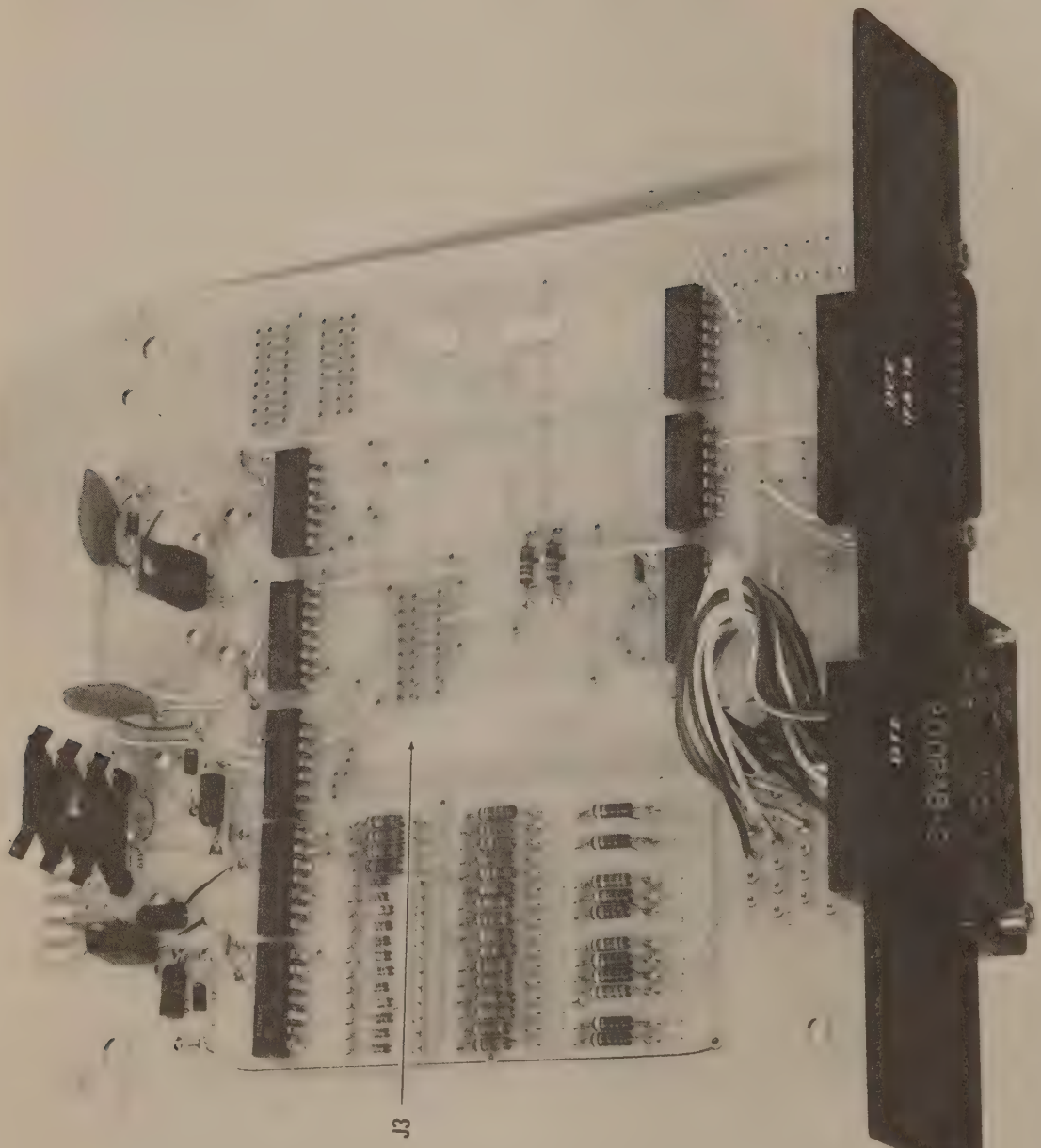


FIGURE 8-1 IFA-16

SECTION 8
V.35 INTERFACE

8.1 INTRODUCTION

The V.35 Interface may be visually identified by the use of the MIL SPEC., MIL-C-22857C, 34-pin connector using two integral jack screws to lock male to female, and single and double letter pin designations. V.35 refers to the standard set forth by the CCITT. We are concerned with the electrical and mechanical descriptions of the interconnection of the DTE terminal and the DCE modem. The V.35 interface contains data and timing signals using balanced current loops, while the secondary controls are RS-232/V.24 electrically.

EIA RS-232/V.24 is defined below 20 kbps, but V.35 is primarily defined for 48 kbps. However, RS-232/V.24 is used easily at the higher speed over modest cable lengths and the IFA module converters will have no difficulty at 48 kbps.

The limiting factor is the loading from the RS-232/V.24 attachment cable and the RS-232/V.24 device.

Because of the electrical and mechanical differences, an adapter or adapters are needed to connect one type of equipment to the other, or to patch V.35 equipment using RS-232/V.24 patching, monitoring, and active test equipment.

The IFA modules designed for V.35 conversion are the following:

IFA-16 converts a V.35 DTE to an RS-232/V.24 DCE (see Figure 8-1).

IFA-17 (Figure 8-2) converts a V.35 DCE to an RS-232/V.24 DTE, using a special cable (see Figure 8-3).

The -1 after the model indicates that the V.35 connector hardware is compatible with American MIL SPEC. equipment. Other numbers indicate subtle differences in the V.35 Interface used in continental European countries, such as different pin diameters and special use of certain signal leads.

A 3-ft stub cable is normally supplied, but cables up to 50 ft are available upon special order. This cable is a model CA-16-X-L, where -X is the V.35 connector version (-1 is for countries speaking English, -2 for Switzerland and France) and -L is the length desired (-3 is standard).

Figure 8-4 diagrams the adapter signal flow for IFA-16 and IFA-17.

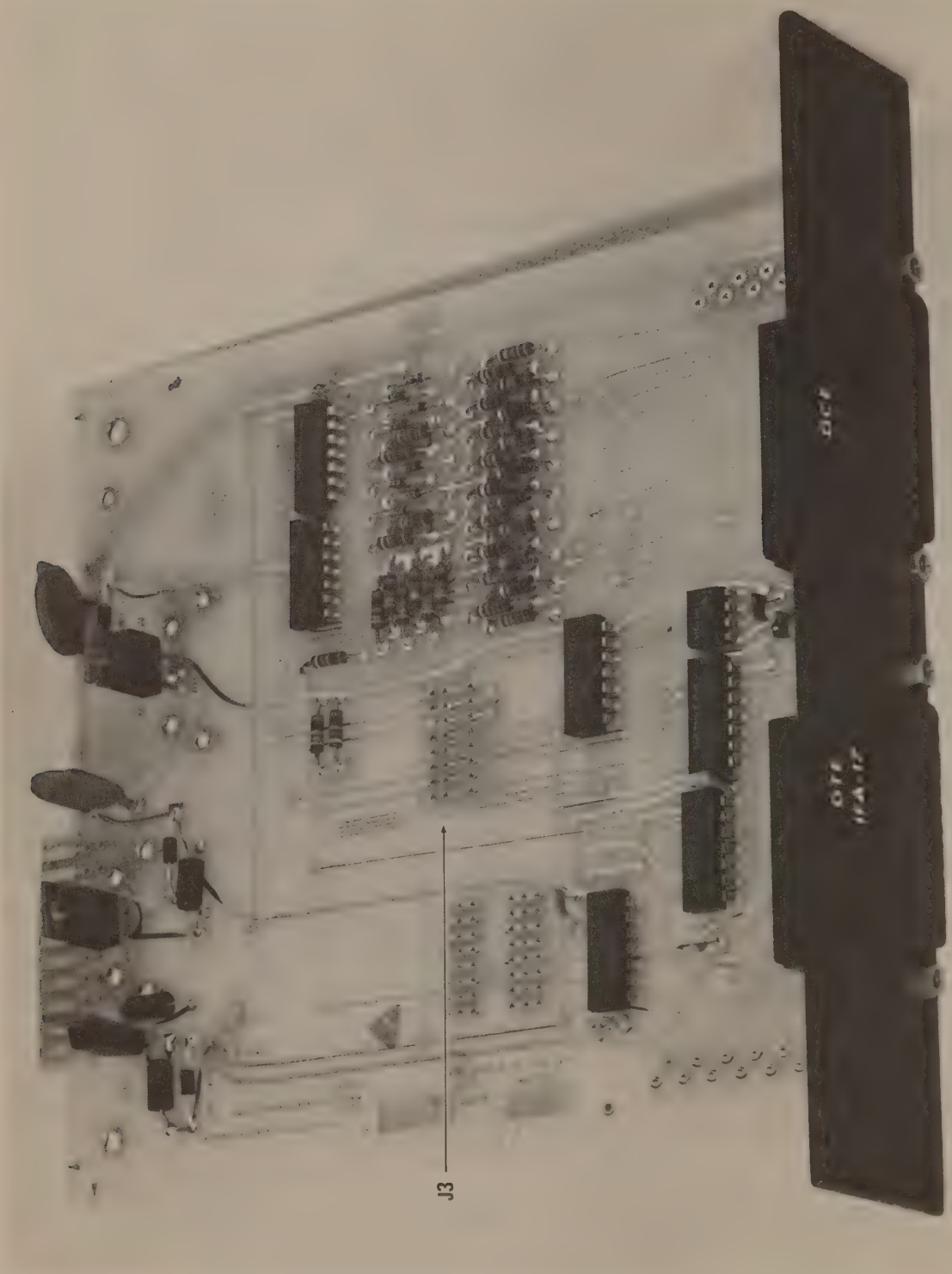


FIGURE 8-2 IFA-17

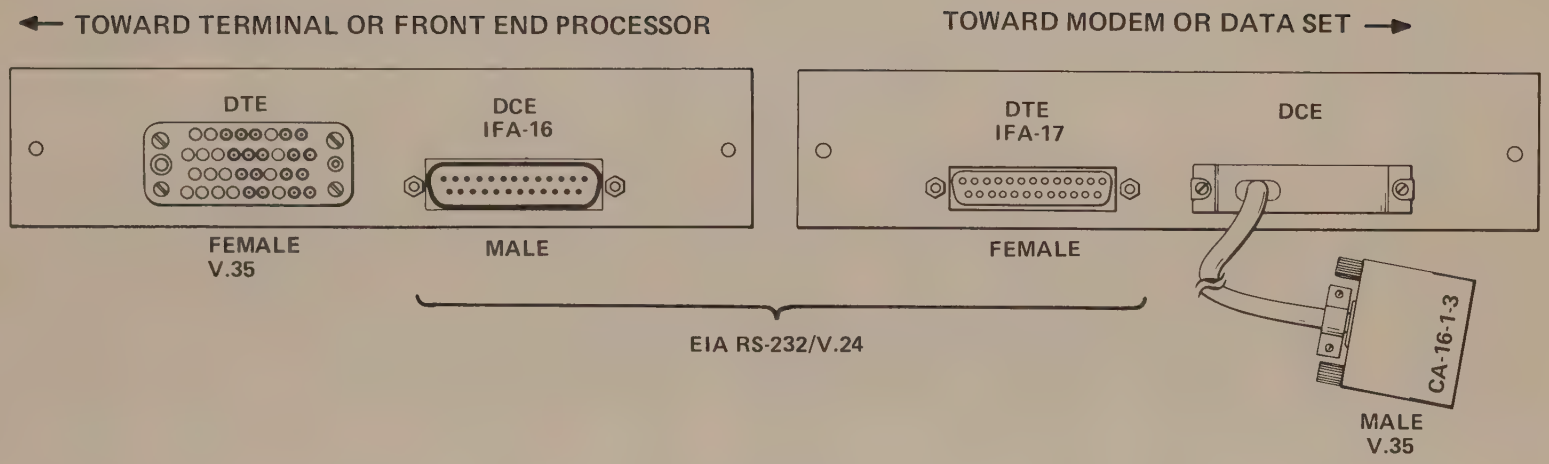

← TOWARD TERMINAL OR FRONT END PROCESSOR
TOWARD MODEM OR DATA SET →
DTE
DCE
IFA-16
DTE
IFA-17
DCE
FEMALE
V.35
MALE
FEMALE
EIA RS-232/V.24
CA-16-1-3
MALE
V.35

FIGURE 8-3

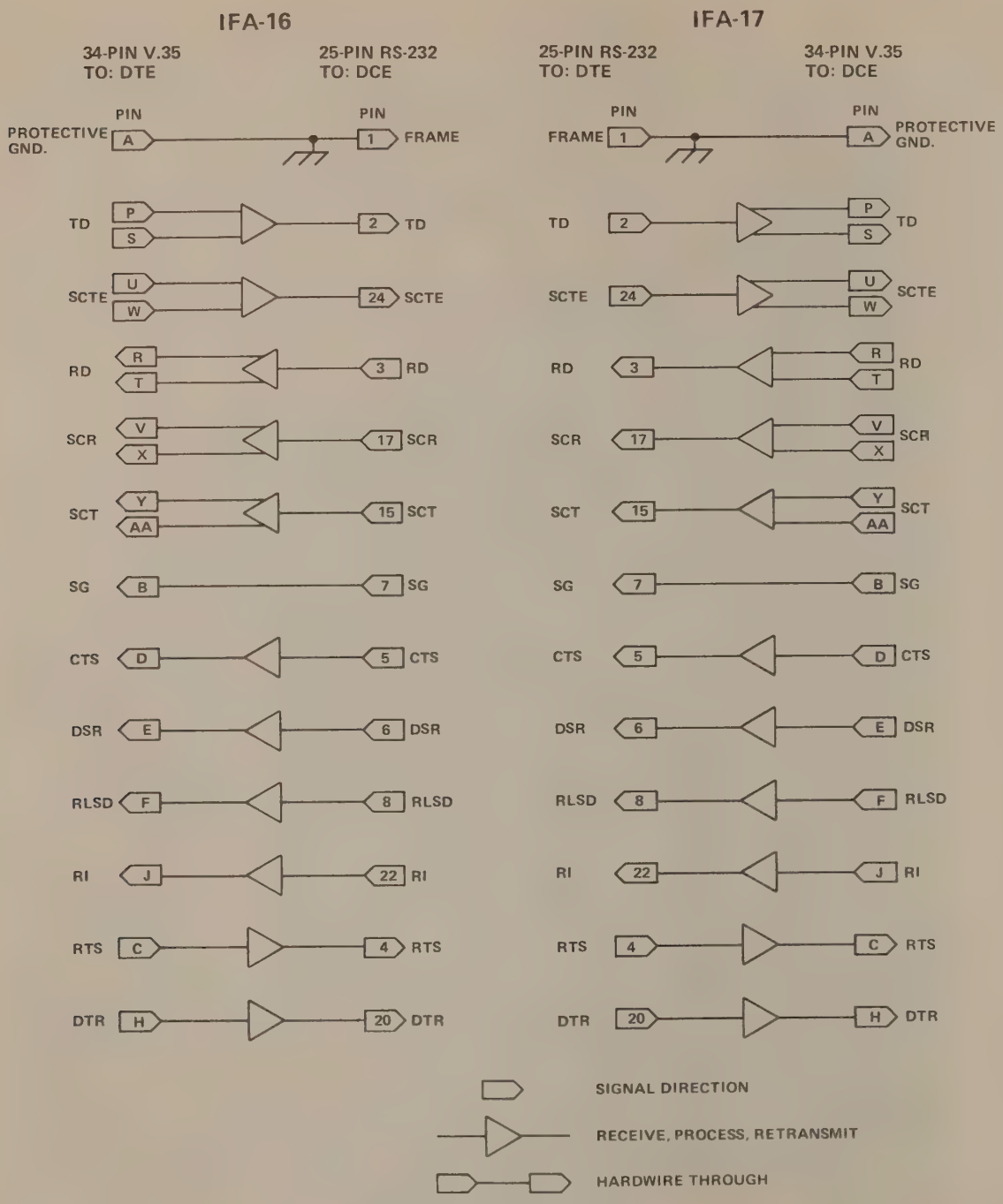


FIGURE 8-4 Signal Conversion Chart: IFA-16 and IFA-17

8.2 IFA-16

The IFA-16 is an interface adapter module which converts signals from a V.35 DTE to an RS-232/V.24 DCE.

8.2.1 Specifications

Power requirements
+160 mA at +15 V
-170 mA at -15 V

Voltage range
±15 to 25 V dc

Maximum usable data signal rate
Approximately 100 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
V.35
34-pin MIL SPEC. type female DTE
RS-232/V.24
25-pin male DCE

NOTICE: All specifications are subject to change without notice.

8.2.2 TTL Test Interface Chart

Table 8-1 is the TTL Test Interface Chart for IFA-16.

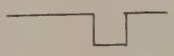
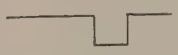
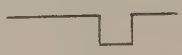
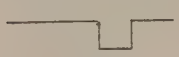
The space condition is indicated on the TTL Test Interface (J3) as a TTL LOW shown by 0 in Table 8-1.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 8-1.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

N.C. means No Connection.

TABLE 8-1
TTL TEST INTERFACE (J3) CHART FOR IFA-16

Pin	Signal Name	Signal	Signal	Signal Name	Pin
1		N.C.	N.C.		16
2	TD	M + S 0	N.C.		15
3	RD	M + S 0	M +5	V_{cc}	14
4	RTS	M + S 0	M + S 0	SCTE	13
5	CTS	M + S 0	M + S 0 	RI	12
6	DSR	M + S 0	M + S 0 	DTR	11
7	SG	S 0	M + S 0 	SCR	10
8	RLSD	M + S 0 	M + S 0	SCT	9

8.3 IFA-17

The IFA-17 is an interface adapter module which converts signals from an RS-232/V.24 DTE to a V.35 DCE, using a special cable (see Figure 8-3).

8.3.1 Specifications

Power requirements
+130 mA at +15 V
-120 mA at -15 V

Voltage range
±15 to 25 V dc

Maximum Usable data signal rate
Approximately 100 kbps
(May vary with application)

Propagation delay
Approximately 0.2 microsecond

Panel dimensions
7 in. wide x 1 1/2 in. high

Panel connectors
RS-232/V.24
25-pin female DTE
V.35
25-pin D male DCE needs stub cable with 34-pin MIL SPEC. male

NOTICE: All specifications are subject to change without notice.

8.3.2 TTL Test Interface Chart

Table 8-2 is the TTL Test Interface Chart for IFA-17.

The space condition is indicated on the TTL Test Interface (J3) as a TTL LOW shown by 0 in Table 8-2. The marking condition is indicated by a TTL HIGH, which is shown as + in Table 8-2.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

N.C. means No Connection.

TABLE 8-2
TTL TEST INTERFACE (J3) CHART FOR IFA-17

Pin	Signal Name	Signal	Signal	Signal Name	Pin
1		N.C.	M + / S 0	SPARE	16
2	TD	M + / S 0	N.C.		15
3	RD	M + / S 0	M +5	V_{cc}	14
4	RTS	M + / S 0	M + / S 0	SCTE	13
5	CTS	M + / S 0	M + / S 0	RI	12
6	DSR	M + / S 0	M + / S 0	DTR	11
7	SG	S 0	M + / S 0	SCR	10
8	RLSD	M + / S 0	M + / S 0	SCT	9

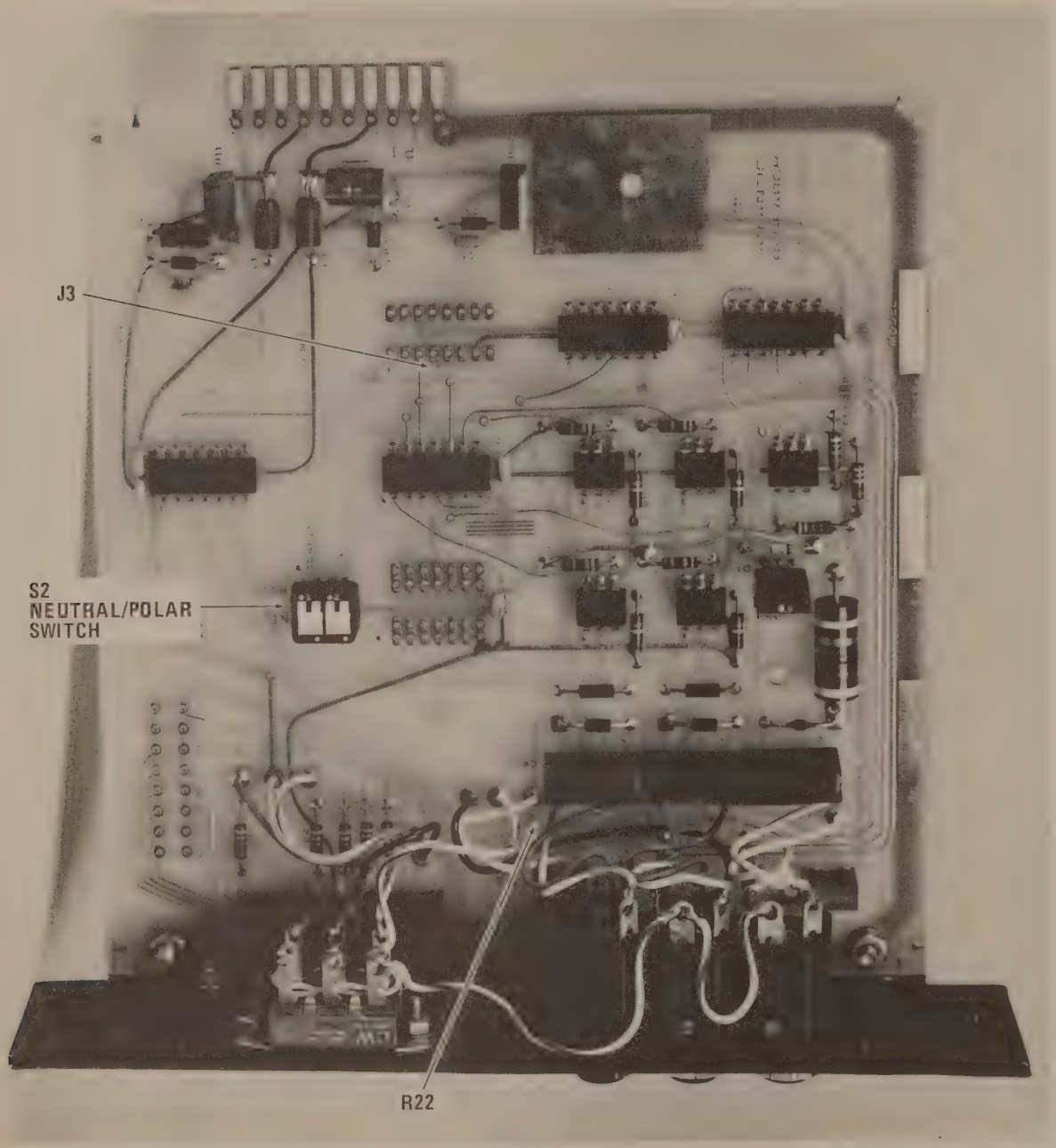


FIGURE 9-1 IFA-18

SECTION 9
CURRENT LOOP INTERFACE

9.1 INTRODUCTION

The traditional current loop interface uses 1/4-in. telephone connectors. There is no published unifying standard, so drastic electrical variations may be found in use. Open-circuit voltages range from 17 V to 270 V. Current is from 20 mA to 80 mA. Neutral circuits maintain current for idle mark condition and the connector tip is usually negative. A space is represented by a break in the current.

Any number of terminals may be looped together in such a system as long as the total loop IR drop does not exceed the power supply.

Polar circuits reverse the polarity instead of breaking current to represent a space. There may only be one transmitter in such a circuit.

Even with electronic keyers and receivers, current loop is the slowest interface. Its main advantages are good noise immunity and compatibility with less expensive equipment.

Because of the electrical and mechanical differences between the current loop and RS-232/V.24 interface, an adapter is needed to connect one type of equipment to the other. The interface adapter module for the current loop interface is the IFA-18. It is fully compatible with the Mounting Rack Assemblies, MRA-25-2 and MRA-25-10, of the other IFA models (see Sections 3 and 4).

9.2 IFA-18

Because there is no DTE or DCE in a current loop, there is only one IFA adapter model for this interface (see Figures 9-1 and 9-2). It has a "null modem" function switch which allows it to satisfy either the DTE or DCE side of the RS-232/V.24 interface.

Another feature of the IFA-18-1 is the monitor channel for compatibility with data monitors such as the Atlantic Research INTERVIEW 3500 or 4500 (see Figures 9-2 and 9-3).

The electronic transmitter circuit is dry neutral; that is, it outputs no power of its own but merely switches the user circuit. It is polarity nonsensitive and will not key strictly polar receivers.

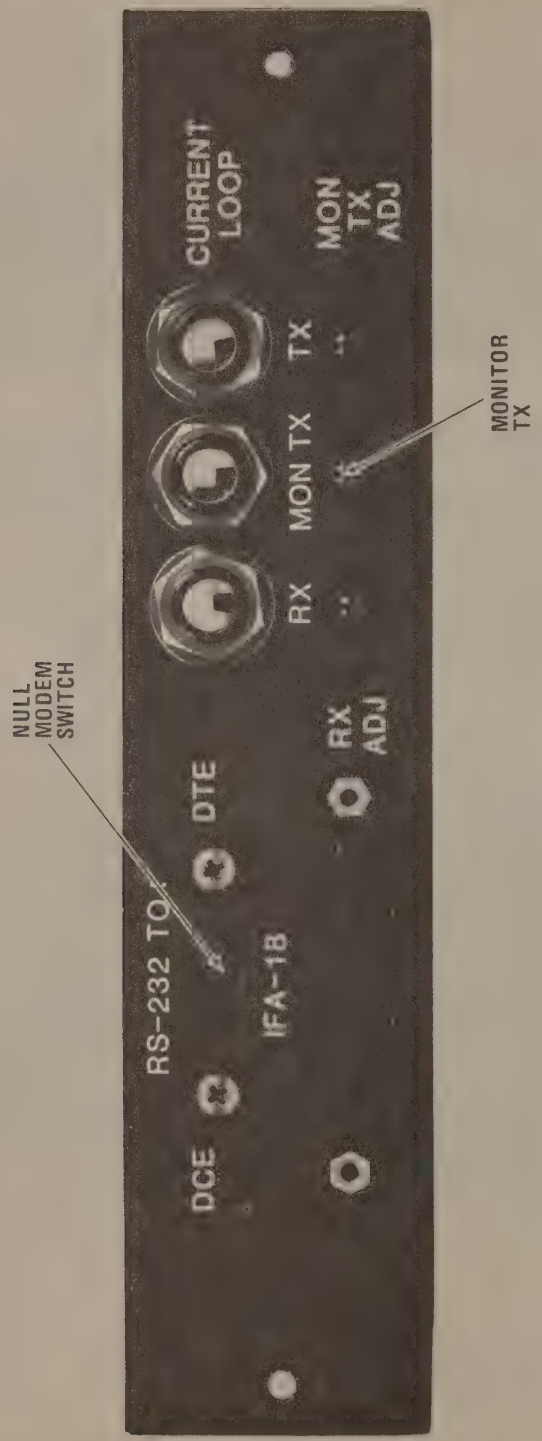

NULL
MODEM
SWITCH
RS-232 TO
DCE
DTE
IFA-18
RX
ADJ
RX
MON TX
TX
CURRENT
LOOP
MON
TX
ADJ
MONITOR
TX

FIGURE 9-2

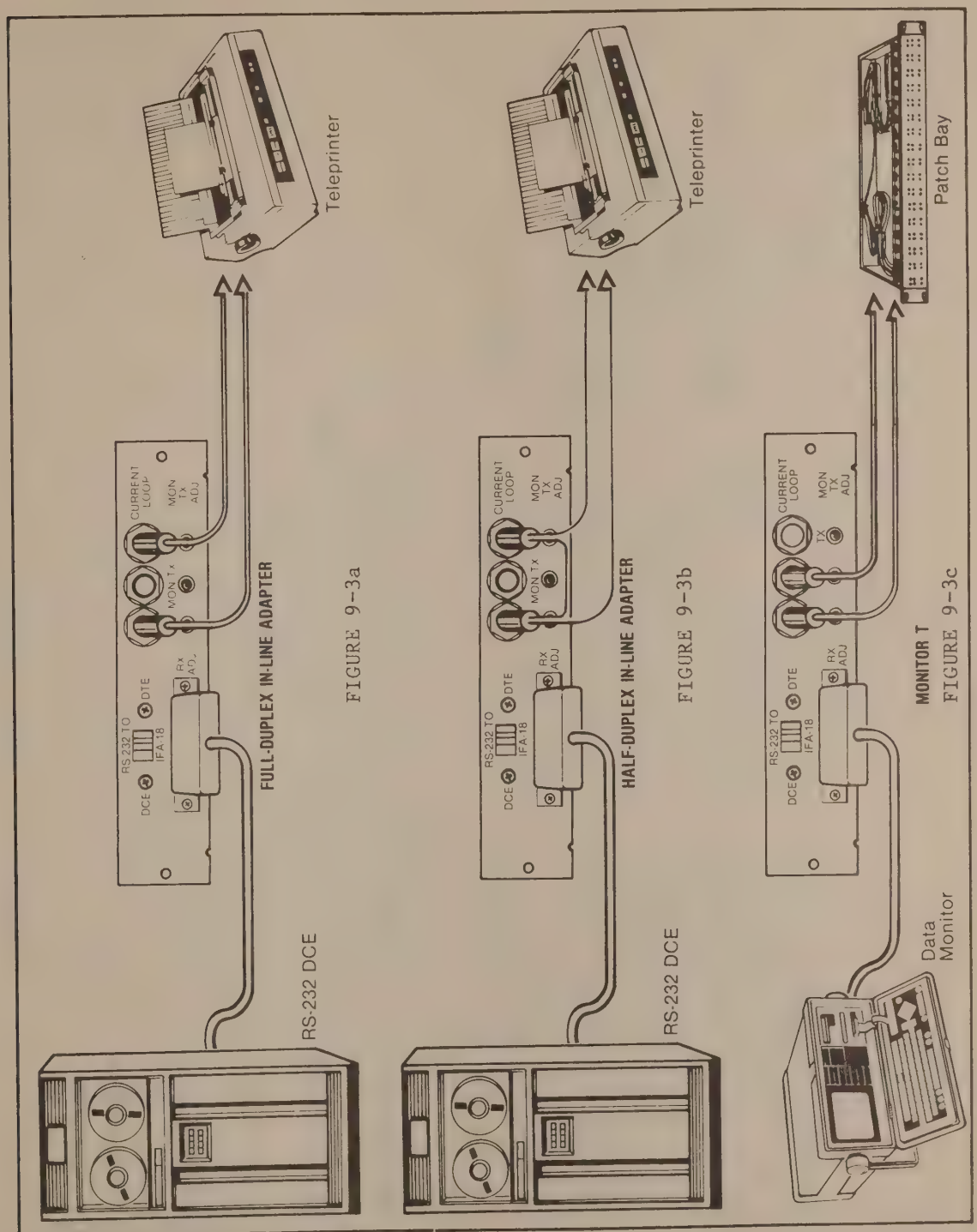

Teleprinter
CURRENT LOOP
MON TX ADJ
MON TX
RS-232 TO
DCE
DTE
IFA-18
RX ADJ
FULL-DUPLEX IN-LINE ADAPTER
RS-232 DCE
FIGURE 9-3a
Teleprinter
CURRENT LOOP
MON TX ADJ
MON TX
RS-232 TO
DCE
DTE
IFA-18
RX ADJ
HALF-DUPLEX IN-LINE ADAPTER
RS-232 DCE
FIGURE 9-3b
Patch Bay
CURRENT LOOP
MON TX ADJ
TX
RS-232 TO
DCE
DTE
IFA-18
RX ADJ
MONITOR T
Data Monitor
FIGURE 9-3c

FIGURE 9-3

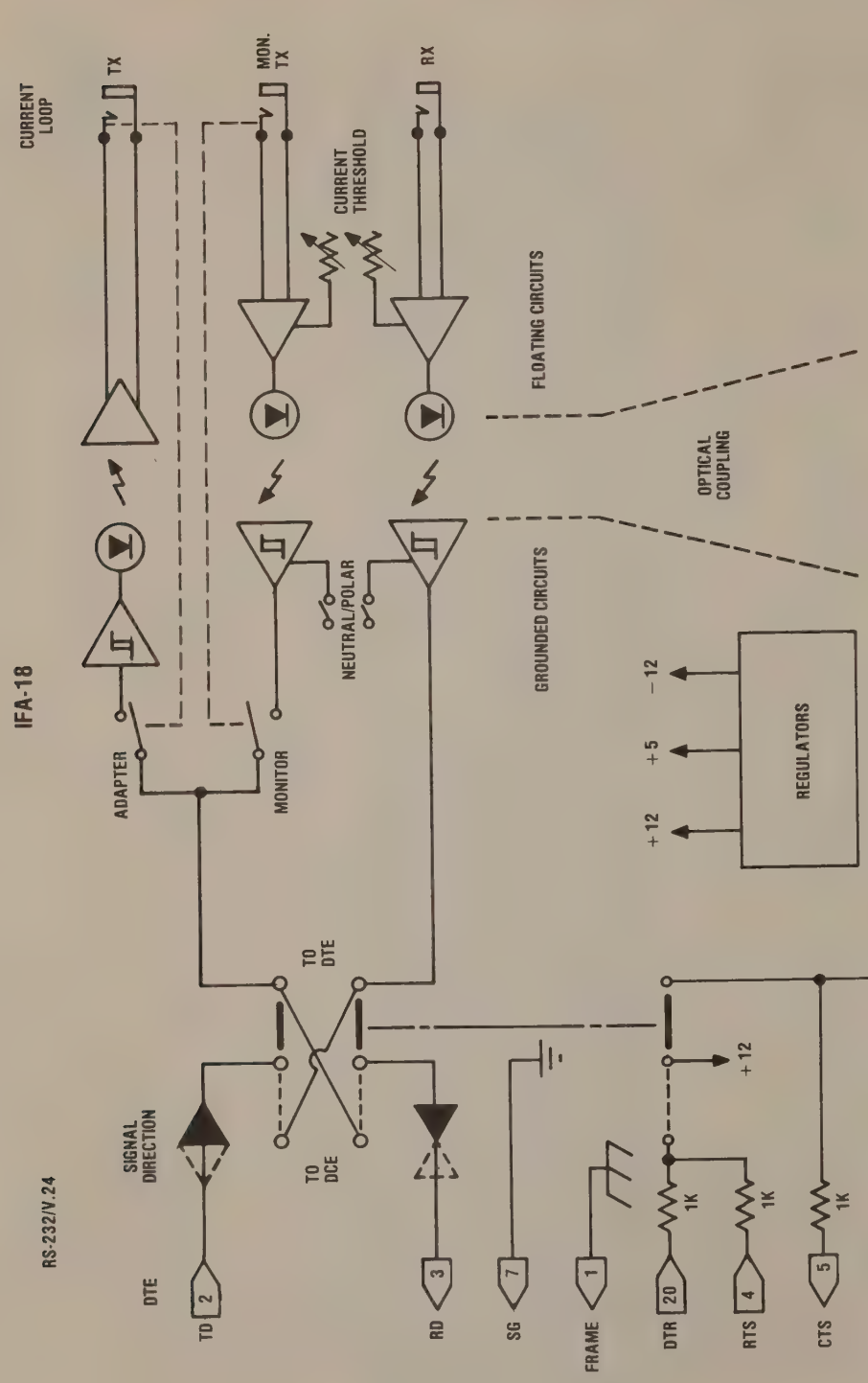


FIGURE 9-4 Signal Conversion Chart: IFA-18

The receivers for RX and MON TX channels may be switched on the IFA-18-1 for polar or neutral circuits (see S2 on Figure 9-1). They are midpoint threshold adjustable for 20-to 80-mA circuits. They interpret negative tip current as a mark condition.

The IFA-18 supplies no power to the loops and electrically floats using optical couplers so there will be no ground conflicts. Figure 9-4 diagrams the adapter signal flow for IFA-18-1.

9.3 SETUP

9.3.1 General Setup

The switch designated RS-232/V.24 TO: (see Figure 9-2) performs a "null modem" function on TD and RD. Set the switch to DTE when connecting a current loop teleprinter to a computer. Set it to DCE when connecting the teleprinter to a modem. When monitoring the circuit with a test device, select the DTE position. See Section 9.3.2 for the specific setup to use the IFA as an adapter or monitor.

The adapter mode and monitor mode are selected according to which loop jack is used, either TX or MON TX. The module is an interface adapter when TX and RX are used. When you select monitor mode, RX and MON TX are used. The TX channel is reversed so that loop data may be seen on both RS-232/V.24 TD and RD by a data monitor (see Figure 9-3).

9.3.2 Connection

CAUTION: Since sleeve connection is floating and loop circuits may use high voltages, use plastic shell phone plugs for safety and comfort.

(a) Adapter Mode. Attach the 25-pin RS-232/V.24 connector to DTE or DCE equipment and set the "null modem" switch (see Figure 9-2) to agree with your selection.

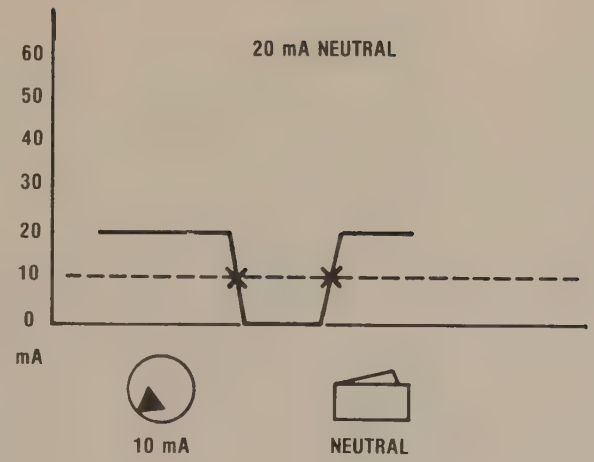
Connect 1/4-inch telephone plugs (two conductor tip and sleeve; no ring) with plastic handles (ARC Stock #38323) to TX and RX jacks. Each jack will be in series with a current loop in a full-duplex system (see Figure 9-3a). Both TX and RX will be in series with a half-duplex loop (see Figure 9-3b). For the RX plug, the tip must be negative.

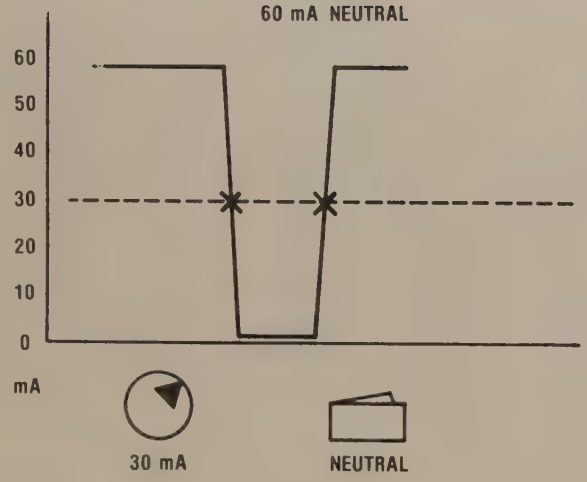
CAUTION: Do not try to use TX and MON TX at the same time.

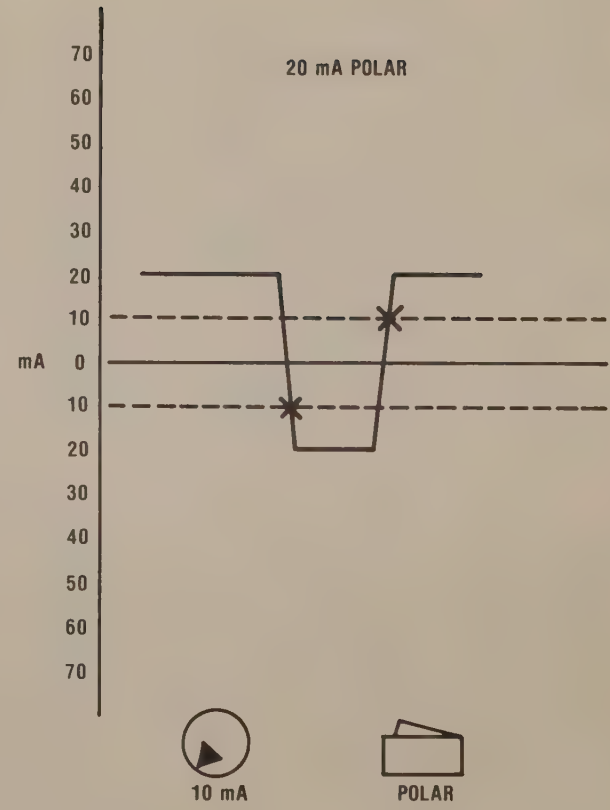
(b) Monitor Mode (see Figure 9-3c). Attach the 25-pin RS-232/V.24 connector to the monitor input of any RS-232/V.24 data monitor. When the null modem switch is in the DTE position, data on TX appears on TD. When the null modem switch is in the DCE position RX data appears on TD. Normally the switch should be set to DTE.

Connect 1/4-inch telephone plugs (two conductor tip and sleeve; no ring) with plastic handles (ARC Stock #38323) to MON TX and RX. Each jack will be in series with a current loop in a full-duplex system. Only one jack needs to be used on a half-duplex system. In this case, set the data monitor to single-line display. The tip of the phone must be connected to the negative side of the loop.

CAUTION: Do not try to use TX and MON TX at the same time.


20 mA NEUTRAL
60
50
40
30
20
10
0
mA
10 mA
NEUTRAL


60 mA NEUTRAL
60
50
40
30
20
10
0
mA
30 mA
NEUTRAL


20 mA POLAR
70
60
50
40
30
20
10
mA
0
10
20
30
40
50
60
70
10 mA
POLAR

SWITCH POINT

FIGURE 9-5

9.3.3 Loop Adjustments

The module is normally shipped with receivers set up for neutral 20-mA loops (see Figures 9-1 and 9-5). The current threshold adjustments are full counterclockwise, making the current threshold about 10 mA. The neutral/polar switches are in the neutral position.

This type of setup will probably work for both polar and 60-mA loops. However, the performance can be improved by reconfiguring the receiver for the specific type of loop being used.

(a) Polar Loop. Set the current threshold to minimum and switch the neutral/polar switches (S2) to the polar position to set the receiver for polar operation. This switch position will not work for neutral loops. Hysteresis may be increased by turning the current threshold up. This will seldom be necessary as the hysteresis is already plus and minus the minimum 10 mA.

(b) Neutral Loop. To set the receiver current threshold for a 60-mA loop, adjust the loop current on your equipment to half the closed-circuit value (30 mA in this case), then increase the IFA-18 adjustment, RX ADJ or MON TX ADJ (see Figure 9-2), until the faceplate light just changes states. Repeat the procedure for the other receiver.

NOTICE: The IFA-18 does not regulate loop current.

9.3.4 IFA-18-1 Specifications

Max. open-loop voltage
  300 V

Max. continuous idle current
  150 mA

Max. loop potential to frame ground
  1500 V

CAUTION: Operation above maximum voltage and current specified herein voids the warranty.

Max. data range
  At least 9600 kbps
  (for higher rates consult ARC)

Circuit type
  Dry keyer
    Neutral
  Receivers (negative tip)
    Neutral/Polar

Adapts directly to DTE or DCE
  (front panel switch)
  RS-232/V.24

Provision for use with data monitor
  (e.g., INTERVIEW 3500 or 4500)
  MON TX channel

Panel connectors
  Current loop
    Three 1/4-in. telephone jacks
      with black plastic handles
      (ARC Stock #38323)
  RS-232/V.24
    1 DB-25 Female

Power requirements
  +250 mA at +15 V
  -50 mA at -15 V

Voltage range
  $\pm$15 to $\pm$25 V dc

Receiver
  Threshold current adjustment
    (switch point) range
    10-40 mA

Dry Keyer Impedance range
  Input impedance
    200 ohms with 4-volt clamp
  Closed
    57 ohms

Internal (PC) controls
  Threshold current
    Neutral/Polar

NOTICE: All specifications are subject to change without notice.

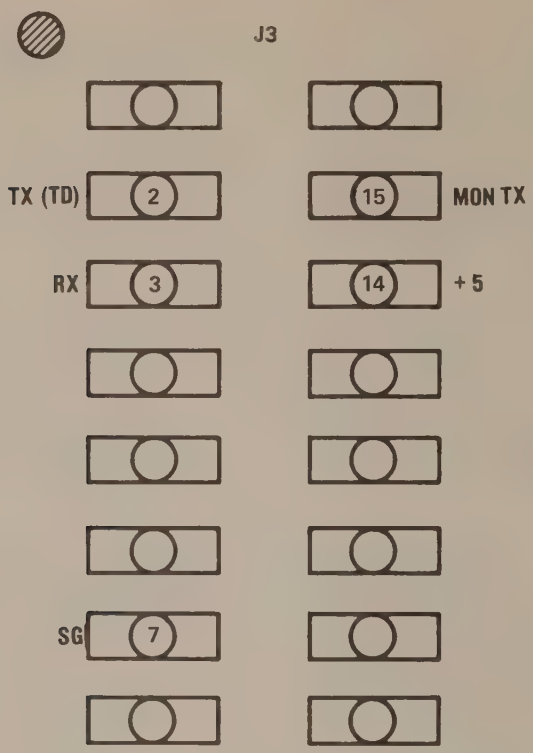


Figure 9-6. TTL Test Socket Interface for IFA-18. Notice that other contacts are not used in this model.

TABLE 9-1
CURRENT LOOP INTERFACE ADAPTER LOGIC

RS-232 /V.24	Signal Condition	Lights	Neutral Loop	Polar Loop	TTL Test	Binary Value
Negative	Mark	Off	Closed	Negative	+5 V	Zeros
Positive	Space	On	Open	Positive	0 V	Ones

9.3.5 TTL Test Socket Interface

Figure 9-6 shows the TTL Test Socket Interface for the IFA-18. RX and TX, or MON TX appears on this 16-pin DIP socket position as inverted TTL levels with respect to signal ground. This test position is similar to that on other IFA modules.

Table 9-1 is a logical guide to the TTL test interface.

The mark condition is indicated by a TTL HIGH or +5 volts which corresponds to a Closed loop. The LED will be OFF to indicate Idle line or Zeros.

The space condition is indicated by a TTL LOW or 0 volt which corresponds to an Open loop. The LED will be ON to show data (Ones).

With this information, the current loop interface could be monitored using TTL instead of the RS-232/V.24 interface.

If you know what should be on the Loop Interface, proper operation can be confirmed by looking at the LEDs which are connected to the TTL interface.

Notice that the TX LED indicates the dry keyer condition and not whether loop current is applied. The LED under the unused jack will be ignored.

SECTION 10
CONVERSION BETWEEN RS-449 AND V.35: IFA-20 AND IFA-21

10.1 INTRODUCTION

IFAs -20 and -21 are digital interface adapters for connection between DTE and DCE of RS-449 and V.35 equipment in satellite data network subscriber connection (Satellite Business Systems, for example) and other high data rate applications.

Although they are set up for Satellite Business System specifications, they may satisfy other English systems as well as V.35 variations found in European systems.

See Section 6 for a description of RS-449.

See Section 8 for a description of V.35.

These modules satisfy all eleven signals of V.35 and only the equivalent primary signals of RS-449. All signals are actively received and regenerated. The class I circuits of RS-449 are all balanced per RS-422 and Fed. Std. 1030. Class I circuit receivers have termination resistors. See Section 10.6 for value.

Unlike the RS-232/V.24 IFAs, IFA-20 and -21 are designed for high data rates used by satellite systems. Propagation delays have been kept as short and as even as possible. Signal distortion is less than 5% at applicable data rates. To achieve this speed, compatibility with the unique requirement of MIL-STD-188-114 Section 4.4 has been sacrificed. See Section 2 for MIL-STD-188 compatibility.

V.35 connector locking is standard English with single lead thread jackscrews. RS-449 spring lock blocks are provided as well as 4-40 machine thread for the common screw retainers.

The modules are compatible with Atlantic Research Corporation's complete line of interface adapters. They can be mounted either in a standard 19-inch rack mounting enclosure which holds ten modules, the MRA-25-10; or in a two-module desk top enclosure, the MRA-25-2, with a self-contained ac supply.

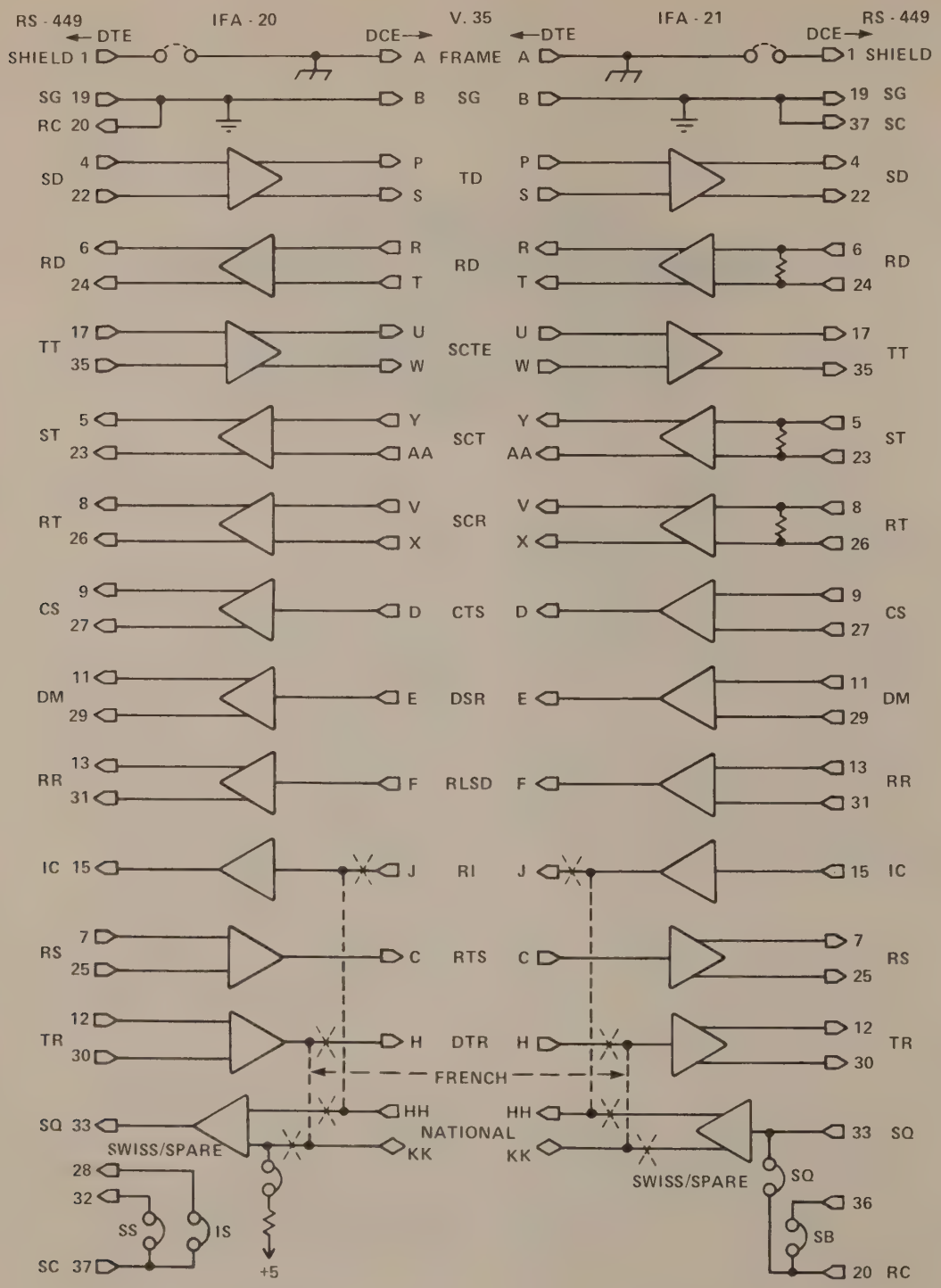


Figure 10-1. Signal Conversion Chart. Model is English V.35. Adaptation to European is represented by jumpers and broken lines. This capability is built into the track on the printed circuit board.

10.2 GENERAL SETUP

There is no operator interface to these modules. Once they are installed they require no further attention. No setup is required for connection to a satellite network. See Sections 3 and 4 for installation of modules into the Mounting Rack Assemblies. In connecting the IFA modules to a system, notice that the module connectors are labeled to identify the side of the interface to which they connect. See model descriptions following.

10.2.1 IFA-20 Setup

IFA-20-1 RS-449 DTE TO V.35 DCE
37-pin female "D" to 34-pin female "M".

No setup is required for satellite subscriber connection. The Pin 1 SHIELD jumper is open. The installer may solder a wire from A to B to provide ground for shielding. The RS-449 signal IC (Pin 33), which is RI in V.35, is not used in satellite networks but is provided and active on the IFA-20 module. RS-449 signal SQ is used in certain European V.35 applications and is therefore provided but disabled. See Section 10.5 and Figure 10-1.

Pins 28 and 32, signals IS and SS respectively, are grounded to Pin 37, Send Common (SC), on the IFA-20. These signals have no equivalents in V.35. They are reserved for national use but the units have international compatibility.

10.2.2 IFA-21 Setup

IFA-21-1 V.35 DTE TO RS-449 DCE
34-pin female "M" to 37-pin male "D".

No setup is required for satellite subscriber connection. The Pin 1 SHIELD jumper is open. The installer may solder a wire from A to B to provide ground for shielding. The RS-449 signal IC (Pin 33), which is RI in V.35, is not used in satellite networks but is provided and active in the IFA-21 module. RS-449 signal SQ is used in certain European V.35 applications and is therefore provided but disabled. See Section 10.5 and Figure 10-1.

Pins 33 and 36, signals SQ and SB respectively, are grounded to Pin 20, Receive Common (RC), on the IFA-21. SB has no equivalent in V.35. It is reserved for national use but the units have international compatibility.

10.3 ACCESSORIES

CA-41-1-5	37-CONDUCTOR "T" CABLE
CAV-P12-L	34-PIN V.35 CABLE
L=LENGTH FEET	P=SEX
1=FEMALE	2=MALE

10.4 TTL TEST INTERFACE CHART

Table 10-1 is the TTL Test Interface Chart for IFA-20 and IFA-21.

The TTL Test Interface Chart shows the signal connections to the J3 position on the printed circuit board. The signals appear as logically inverted TTL voltage levels with respect to signal ground. This connector position is compatible with those on other IFA modules.

TABLE 10-1
TTL TEST INTERFACE (J3) CHART FOR IFA-20 AND IFA-21

Pin #	Signal Name	Pin #	Signal Name
2	TD	14	+5 V dc
3	RD	13	SCTE
4	RTS	12	RI (NOT SBS)
5	CTS	DD	DTR
6	DSR	10	SCR
7	SG	9	SCT
8	RLSD		

Table 10-2 is the Logic Table for IFA-20 and -21. It is a guide to the use of the monitor test points shown in Table 10-1. The mark condition is indicated by a TTL HIGH voltage. The space condition is indicated by a TTL LOW voltage.

10.5 SPECIAL APPLICATIONS

Special setup of the IFA-20 and -21 will be required to unground "national" signals or to enable the "spare" signal from the DCE. The latter has European application. Otherwise, no setup will normally be required.

10.5.1 IFA-20

Ungrounding "national" signals: The IS and SS jumpers may be removed to unground those signals if drivers are present in user equipment.

Enabling of "spare" signal from DCE: If the -2 European (1 mm pin diameter) connector assembly is present, HH and KK may be connected to HHS and KKS respectively and the SWISS jumper removed to activate the "spare" signal to SQ.

CAUTION: Do not remove this jumper unless this spare receiver will be terminated with an input.

10.5.2 IFA-21

Ungrounding "national" signals: The SQ and SB jumpers may be removed to unground those signals if drivers are present in user equipment.

Enabling of "spare" signal from DCE: If the -2 European (1-mm pin diameter) connector assembly is present, HH and KK may be connected to HHS and KKS respectively and the SQ jumper removed to activate the "spare" signal from SQ.

10.6 SPECIFICATIONS

Maximum usable data rate
Approximately 1.544 Mbps
(May vary with application)

RS-449 Load
100 ohms

Cable Length
400 feet at maximum data rate

Drivers
RS-422 balanced only

V.35 (per CCITT)
Cable Length
20 feet at maximum data rate
50 feet at CCITT recommended rates

Distortion
Better than RS-334
at maximum 1.544 Mbps

Signals
11 standard V.35
1 spare balanced to DTE

Dc current
+48 mA
-165 mA from MRAs

TABLE 10-2
IFA-20 AND IFA-21 LOGIC

RS-232/V.24	Signal Condition	TTL Test	Binary Value
Negative	Mark	Hi	Zero
Positive	Space	0 V	One

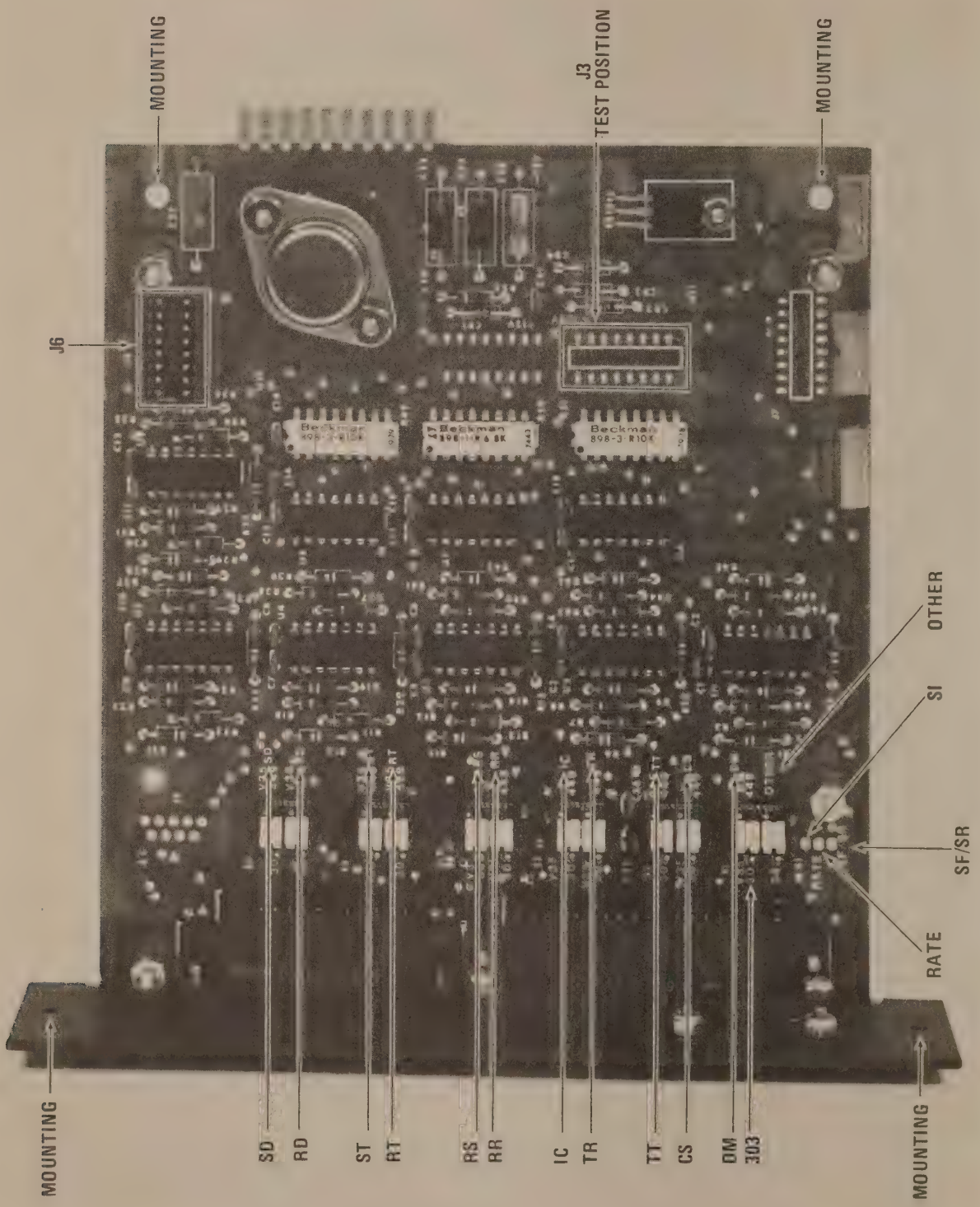


FIGURE 11-1 IFA-22

SECTION 11
HIGH-IMPEDANCE INTERFACE MONITOR

11.1 IFA-22

The IFA-22 is a high-impedance interface monitor adapter that allows RS-232/V.24-monitoring test equipment to be bridged across other operating interfaces. It is conditioned for a specific interface by setting switches on the PC board and by using the appropriate monitor adapter cable. It is compatible with MRA-25-2 and MRA-25-10, the Mounting Rack Assemblies used with the other IFAs.

The IFA-22-1 model converts twelve signals in the interface. The IFA-22-7 model converts these twelve signals plus five more unbalanced signals for RS-449 secondary signals on the 9-pin connector, and RATE.

The IFA-22 accommodates all low-level interfaces which are adapted by IFA-10 through IFA-17, namely X.20/X.21, RS-449, Bell 303, and English and European V.35. These interfaces are discussed in Sections 5 through 8.

NOTICE: Use IFA-18 to monitor current loop (see Section 9). If emulation is required, use IFA-10 through -17 (see Sections 5 through 8).

Other low-voltage interfaces can be monitored by the IFA-22 with customer-supplied adapting cables. For example, it can be used to monitor a data-communications system using the new RS-485 recommended specification (update of RS-422 for multidrop transceive operation).

11.2 SETUP

11.2.1 General Information

For the widely used interfaces, set the IFA-22 printed circuit board switches (see Figure 11-1) to the position marked for the desired interface and connect the appropriate monitor adapter cable or T-cable. Figure 11-2 shows the cable hook-up area on the front of the IFA-22-7. Other IFA-22 models have the same front panel connectors except that there is a blank panel in place of the 9-pin connector. Table 11-1 lists IFA-22 models and interface cables. Section 11.2.2 and Figure 11-3 give specific information on setup for widely used interfaces.

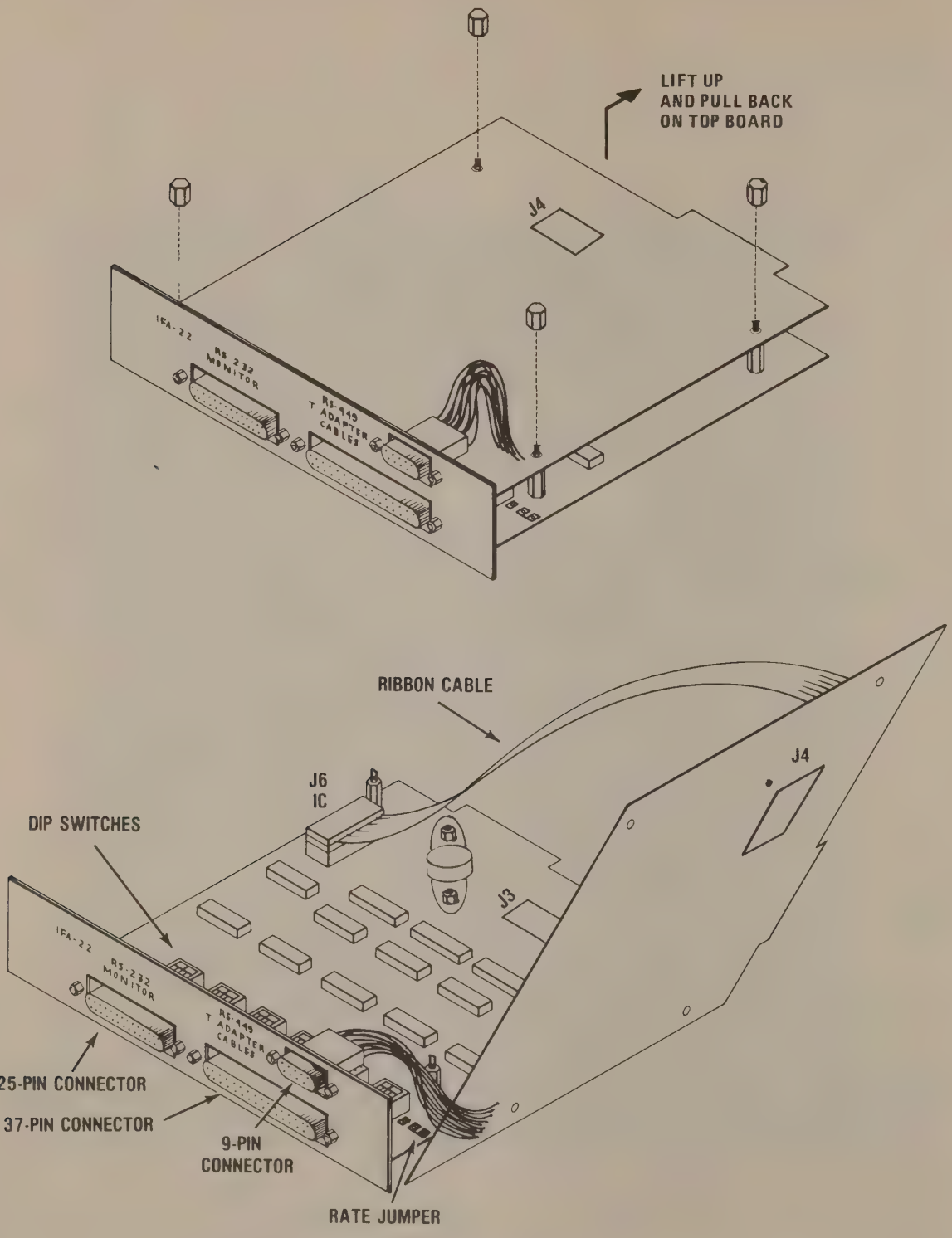


FIGURE 11-2 IFA-22-7

TABLE 11-1
IFA-22 MODEL LIST

IFA Model No.	Description	Interface cable	Cable Model No.
IFA-22-1	Primary module	(No cable included)	----
IFA-22-2	Primary module	RS-449 ribbon 37-pin T-cable (primary extension)	CA-41-1-5
IFA-22-3	Primary module	V.35 English monitor adapter cable (with screw locks)	CA-44-1-5
IFA-22-4	Primary module	V.35 European monitor adapter cable (with guide pins only)	CA-44-2-5
IFA-22-5	Primary module	Bell 303 monitor adapter cable (twisted pair)	CA-43-1-5
IFA-22-6	Primary module	X.20/X.21 monitor adapter cable	CA-40-1-5
IFA-22-7	Expanded module	RS-449 ribbon 37-pin T-cable (primary extension) and	CA-41-1-5
		secondary RS-449 ribbon 9-pin T-cable (secondary extension)	CA-42-1-5

Note: The RS-232/V.24 25-pin T-cable (for monitor connection) CA-18-1-5 and any of the above interface cables may be ordered separately.

There are twelve switches in a row of six dual DIP packages. The first eleven rocker switches are labeled with two-letter RS-449 signal designation names to aid in setup for special interfaces (see Figure 11-1). Section 11.2.4 and Tables 11-2 and 11-3 give specific information on setup for special interfaces.

The twelfth or last rocker switch is a function switch which affects nine of the other switched inputs (it sets threshold for neutral signals such as Bell 303).

Although labeled by interface type for simple field reprogramming, the DIP switches on the printed circuit board are actually conditioning individual signal receivers for balanced, polar unbalanced, or neutral unbalanced signals. However, for the widely used interfaces, you need not be concerned with these details.

The RATE jumper is at the end of the row of DIP switches. This is only of concern on the IFA-22-7, which has a piggyback board.

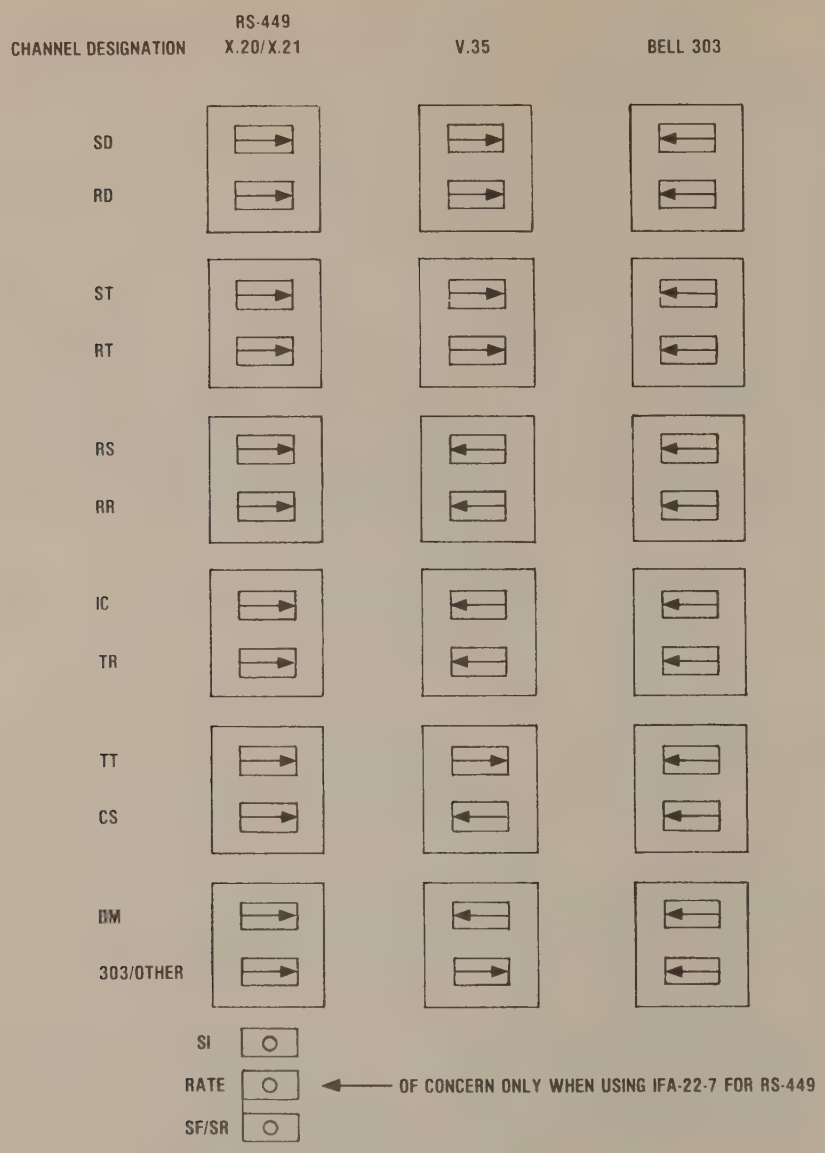


FIGURE 11-3 Setup for Widely Used Interfaces

11.2.2 Setup for Widely Used Interfaces

Hold the IFA-22 with the face plate on the left so that you can easily read the labels by the switches (see Figure 11-1). Determine which interface you want to monitor. If the desired interface is RS-449, V.35, or Bell 303, then check that each rocker switch on the module is positioned down toward the desired interface label. For Bell 303, all rocker switches should be down toward the left side or front of the board. For RS-449 or any interface based on electrical specifications RS-422, RS-423, or RS-485 including X.20/X.21, all rocker switches should be down toward the right side or rear of the board. See Figure 11-3 for setup of widely used interfaces.

Follow the module installation instructions in Section 3 if you are installing the IFA-22 in an MRA-25-2 or Section 4 if you have an MRA-25-10. Then connect the proper Interface Monitor Adapter Cable to the 37-pin female sub-mini D-connector on the faceplate. Connect the 25-pin cable (CA-18-1-5) to the monitor input of an Atlantic Research Corporation INTERVIEW 3500/4500 or similar test instrument (see Figure 11-4).

11.2.3 Secondary Signals

For RS-449, if the secondary signals 9-pin connector is needed, then the IFA-22-7, which includes the CA-42-1-5 9-pin T-cable, is required (see Figure 11-2). These secondary signals are always unbalanced so no program switches are needed on the piggyback PC board assembly.

(a) The Piggyback Board. There are no switches or functional jumpers on the piggyback secondary signal board (see Figures 11-2 and 11-5). Setup is accomplished on the main board only.

The IFA-22-7 is shipped from the factory with switches preset for RS-449 (see Figure 11-3). Normally, it would not be necessary to change any of these settings. If it becomes necessary to change the switch settings on the main board, the piggyback board must be removed in the following manner (see Figure 11-2).

(b) Removing The Piggyback Board. Figure 11-2 is a drawing of the IFA-22-7 showing the removal of the piggyback board.

1. Remove the nuts mounted on the top of the posts located at the top of the piggyback board.

2. Lift the top board slightly until the board is clear of the screw posts and gently pull the board toward the rear until it slides out from under the rear of the 9-pin connector.

3. Tilt the board to the right, being careful not to put strain on the wires of the 9-pin connector or the ribbon cable that is attached to the J6 Integrated Circuit.

4. Make the necessary changes on the main board (see Figures 11-1 and 11-2) and use the reverse of this procedure to reassemble the IFA-22-7.

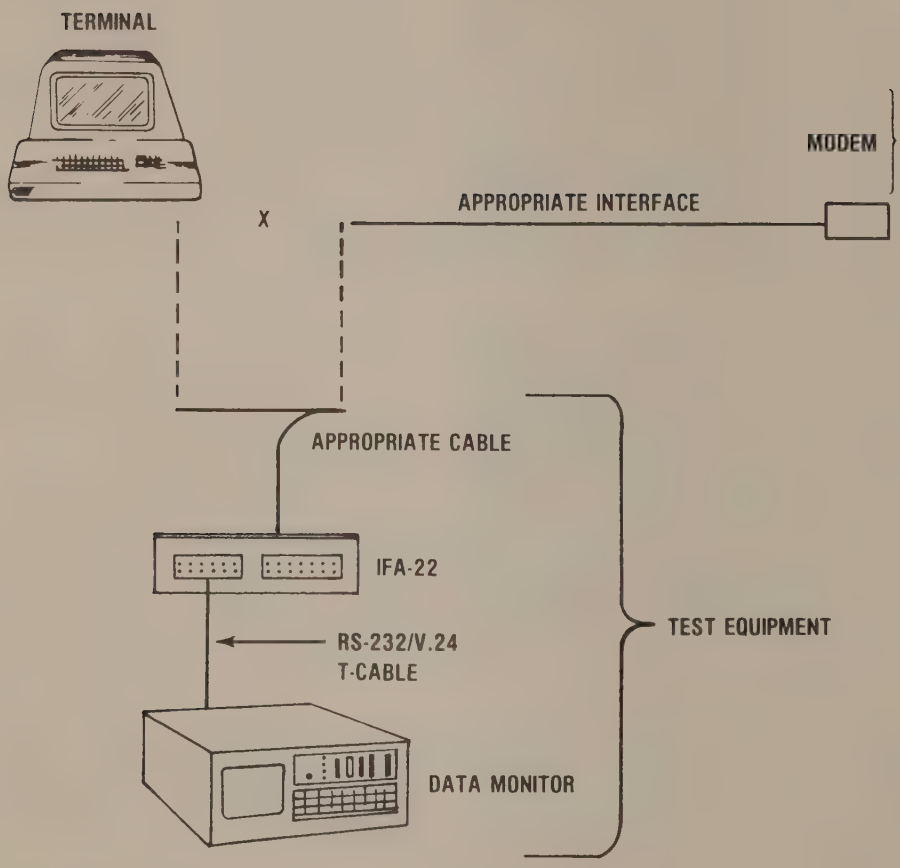

TERMINAL
MODEM
APPROPRIATE INTERFACE
X
APPROPRIATE CABLE
IFA-22
RS-232/V.24
T-CABLE
TEST EQUIPMENT
DATA MONITOR

FIGURE 11-4

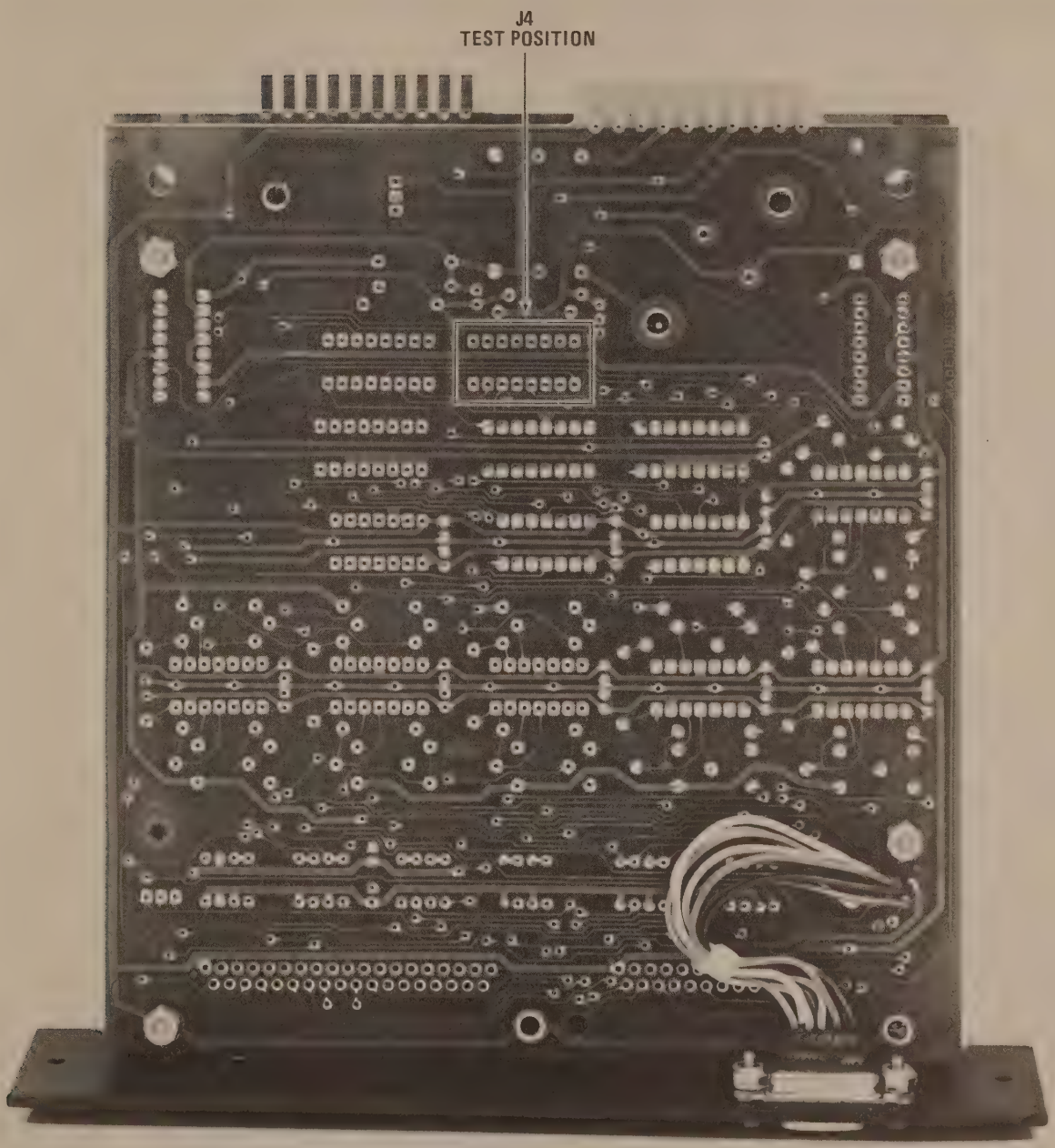


FIGURE 11-5 Top View of IFA-22-7

TABLE 11-2
'IFA-22 MONITOR ADAPTER INTERFACE (RS-449)

Signal Designation	RS-449 (Diff) Pins		Unbalanced Pins	
	A Lead	B Lead	A Lead	Reference
SD	4	22	4	19 (SG)
RD	6	24	6	19 (SG)
ST	5	23	5	19 (SG)
RT	8	26	8	19 (SG)
RS	7	25	7	19 (SG)
RR	13	31	13	19 (SG)
IC	15	20 (RC)	15	19 (SG)
TR	12	30	12	19 (SG)
TT	17	35	17	19 (SG)
CS	9	27	9	19 (SG)
DM	11	29	11	19 (SG)
SQ	33	20 (RC)	33	20 (RC)
SF/SR (Note 1)	16	19		---
SI (Note 1)	2	19		---
SSD (Note 2)	3	5		---
SCS (Note 2)	8	5		---
SRS (Note 2)	7	5		---
SRD (Note 2)	4	5		---
SRR (Note 2)	2	5		---

Note: First item in double pin designation is (A) lead in balanced channel.

Note 1: SF/SR or SI depending on RATE jumper. IFA-22-7 only.

Note 2: Secondary signal interface 9-pin connector. IFA-22-7 only.

TABLE 11-3
INPUT CONDITIONING FOR SPECIAL INTERFACES

Signal Designation	303		Other	
	Left	Right	Left	Right
SD	Neutral	Differential	Polar	Differential
RD	Neutral	Differential	Polar	Differential
ST	Neutral	Differential	Polar	Differential
RT	Neutral	Differential	Polar	Differential
RS	Neutral	Differential	Polar	Differential
RR	Neutral	Differential	Polar	Differential
IC (Note 1)	Polar	Differential	Polar	Differential
TR	Polar	Differential	Polar	Differential
TT	Neutral	Differential	Polar	Differential
CS	Neutral	Differential	Polar	Differential
DM	Neutral	Differential	Polar	Differential
303/OTHER (Note 2)	----303----		----Other----	

Note 1: Signal IC input is relative to RS-449 Receive Common, not Signal Ground

Note 2: This switch changes nine polar positions to neutral but does not change the differential function.

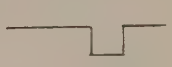
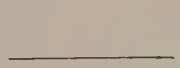
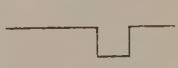
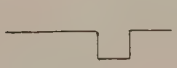
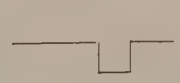
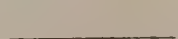
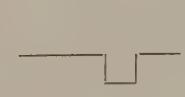
11.2.4 Special Interfaces

The IFA-22 may still be used even if your interface or signal type is not one of the widely used ones already mentioned.

The IFA-22 accepts signal voltages which are less than ±12 volts with respect to signal ground, as low level. Inputs respond to balanced, unbalanced polar or unbalanced neutral signals. You will need documentation for your interface so that an appropriate cable can be made to connect to the 37-pin sub-mini D-connector input of the IFA-22-1. The input switches must be individually conditioned for the electrical characteristic of each signal in the interface (see Tables 11-2 and 11-3). The switches are labeled with two letter RS-449 signal designations to aid in setup for special interfaces.

NOTICE: Electrical specifications are often mixed within an interface.

TABLE 11-4
TTL TEST INTERFACE CHART FOR IFA-22

Pin	Signal Name	Signal	Signal	Signal Name	Pin
		J3			
1		N.C.	N.C.		16
2	TD	M + S 0	M + S 0	SQ	15
3	RD	M + S 0	N.C.		14
4	RTS	M + S 0	M + S 0 	SCTE	13
5	CTS	M + S 0	M + S 0	RI	12
6	DSR	M + S 0	M + S 0	DTR	11
7	SG	S 0 	M + S 0 	SCR	10
8	RLSD	M + S 0 	M + S 0	SCT	9
		J4			
2	SCTD	M + S 0	N.C.		16
3	SRD	M + S 0 	M + S 0 	RATE: SI to DTE; SF/SR to DCE	14
4	SRTS	M + S 0 			
5	SCTS	M + S 0			
8	SRLSD	M + S 0			

11.3 SPECIFICATIONS

Dc current requirements
from MRA-25
±15 V
Primary module, IFA-22
+100 mA at +15 V
-65 mA at -15 V

IFA-22-7
+160 mA at +15 V
-110 mA at -15 V

Maximum usable data signal rate
Approximately 250 kbps
(May vary with application)

Hysteresis
45 mV

Voltage range
±12 V input

Bell 303
10 mA threshold

Power requirements

±15 V from
MRA-25-2 or MRA-25-10
with PS-27-1

Panel dimensions

7 in. wide x 1 1/2 in. high
17.78 cm wide x 3.81 cm high

Panel connectors

DB 25-pin female
to RS=232/V.24 monitor

Dc 37-pin female
to interface monitor input

DE 9-pin secondary
additional for IFA-22-7 only

NOTICE: All specifications are subject to change without notice.

11.4 TTL TEST INTERFACE CHART

Table 11-4 is the TTL Test Interface Chart for IFA-22.

The space condition is indicated on the TTL Test Interface (J3 and J4) as a TTL LOW shown by 0 in Table 11-4.

The marking condition is indicated by a TTL HIGH, which is shown as + in Table 11-4.

An LED connected from V_{cc} to a control lead would light to indicate the ON function of RS-232/V.24. An LED connected from V_{cc} to TD, for example, would not light until data (SPACES) was present.

N.C. means No Connection.

APPENDIX A
INTERFACE STANDARDS

SPEC	SIGNAL	SPEED	CONN	SIGNAL FUNCTIONS	NOTES
RS-422	Balanced	10 mbps	--	--	IC SPEC ≈V.11=X.27
RS-423	Unbalanced	100 kbps	--	--	IC SPEC ≈V.10=X.26
V.28	Unbalanced	20 kbps	--	--	Voltage/Impedances
RS-232	Unbalanced	20 kbps	DB-25	Yes	≈V.24
V.24	V.28	20 kbps	DB-25	--	--
RS-449	Balanced (RS-422) Unbalanced (RS-423)	2 mbps	DB-37 & DB-9	Yes	DB-9 for Secondary Channel
V.35	Balanced (SIGS) Unbalanced V.28	48 kbps	34-pin	Yes	--
Bell 303	Unbalanced	230.4 kbps	coaxial	Yes	--
X.20	(X.26, X.27)	--	DB-15	Yes	Link Level, ASYNC ASCII
	V.28	--			
X.20 BIS	V.24/V.28	--	DB-25	Yes	
X.21	(X.26, X.27)	--	DB-15	Yes (X.24)	Link Level, SYNC ASCII
	V.28	--			
X.21 BIS	V.28	--	DB-25		
	V.28, X.26	--	DB-37		
	V.35	48 kbps	34-Pin		
X.25 User--Network	--	--	-- DB-25	X.21, X.21 BIS	Link Level Packet Level
X.75 Network--Network	--	--	--	V.35	Link Level Packet Level

APPENDIX B
SIGNAL EQUIVALENTS

B-1 Primary Channel*

J3 TTL Testpoints	X.20 (ASYNC)	X.21 (SYNC)	RS-232 (V.24)	RS-449 Primary	BELL 303		V.35	
1 FG**	1 (shield)	1 (shield)	1 FG**	1 (shield)	___	___	A	PG**
2 TD	2,9 T	2,9 T	2 TD	4,22 SD	E	SD	P,S	TD
3 RD	4,11 R	4,11 R	3 RD	6,24 RD	K	RD	R,T	RD
4 RTS		3,10 C	4 RTS	7,25 RS	D	RS	C	RTS
5 CTS			5 CTS	9,27 CS	C	CS	D	CTS
6 DSR			6 DSR	11,29 DM	F(cc)	DSR	E	DSR
7 SG	8 G	8 G	7 SG	19 SG	(shields)		B	SG
8 RLSD		5,12 I	8 RLSD	13,31 RR	M(cc)	AGC	F	RLSD
9 SCT		6,13 S	15 SCT	5,23 ST	J	SCT	Y,AA	SCT
10 SCR		6,13 S	17 SCR	8,26 RT	L	SCR	V,X	SCR
11 DTR			20 DTR	12,30 TR	M(oc)	DTR	H	DTR
12 RI			22 RI	15 IC	F(oc)	RI	J	RI
13 SCTE			24 SCTE	17,35 TT	H	SCTE	U,W	SCTE
15 SQ			21 SQ	33 SQ				
16 RATE		7,14 B†	23 RATE	16 SF/SR (to DCE)				

*First item in double pin designation is (A) lead in balanced channel.

**FG = frame ground; PG = protective ground

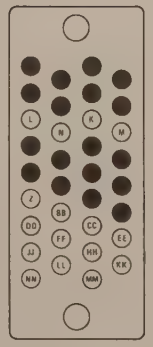
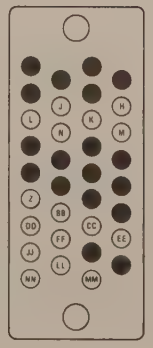
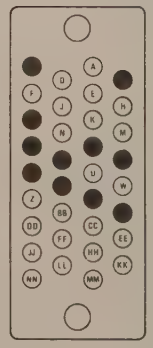
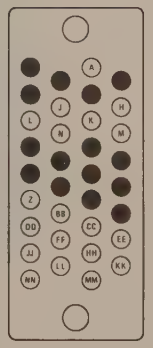
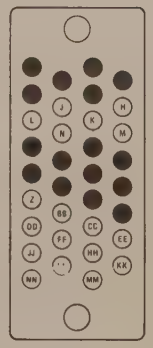
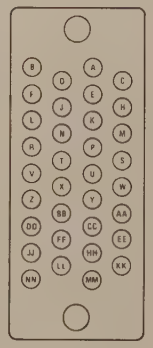
†Signal not equivalently wired to RS-232/V.24. User must jumper according to requirement.

B-2 Secondary Channel

J4 TTL Testpoints	X.20 (ASYNC)	X.21 (SYNC)	RS-232 (V.24)	RS-449 (Secondary)	BELL 303	V.35
2 SCTD			14 SCTD	3 SSD		
3 SRD			16 SRD	8 SCS		
4 SRTS			19 SRTS	7 SRS		
5 SCTS			13 SCTS	4 SRD		
8 RLSD			12 RLSD	2 SRR		
14 RATE			23 RATE	2 SI (to DTE)		

APPENDIX C
V.35 APPLICATIONS INFORMATION

V.35 Compatibility*

MODE L	–1	–2	–91	–1	–1	
MECHANICAL: PIN DIAMETER INCHES	U. S. 0.060"	FRANCE SWITZERLAND 0.040"	SWEDEN 0.040"	AUSTRALIA ENGLAND 0.060"	JAPAN (NTT STANDARD) 0.060"	
CONNECTOR LOCKING	SINGLE LEAD JACKSCREW	SPRING CLIPS WITH GUIDE PINS	DOUBLE LEAD JACKSCREW	SINGLE LEAD JACKSCREW	SINGLE LEAD JACKSCREW	
ELECTRICAL: USED PINS BLACKED IN VIEW OF PLUG FROM RECEPTACLE						

* Atlantic Research Corporation would like to hear of any other configurations that are in use. Please use the form on pages 65 and 66 and send documentation to:

Atlantic Research Corporation
Teleproducts Division
New Products Development Group
5390 Cherokee Avenue
Alexandria, Virginia 22314

FIGURE C-1

V.35 ELECTRICAL USED IN _____ BY _____
Country Customer

(Please Print)

NAME: _____
COMPANY: _____
ADDRESS: _____
_____
CITY: _____ COUNTRY: _____
PHONE: _____ TELEX: _____
CONTACT: _____

COLUMN 1: CORRECT PIN DESIGNATIONS IF NECESSARY.
COLUMN 2: ADD CIRCUIT NUMBER WHERE MISSING.
COLUMN 3: ADD SIGNAL NAME WHERE MISSING.
COLUMN 4: ADD SIGNAL DIRECTION WHERE NECESSARY.
COLUMN 5: CORRECT ASSICIATED PIN FOR TWISTED PAIRS.
COLUMN 6: FILL IN WIRE INSULATION COLOR.

Attach here.

Business Card, or Stamp

CONNECTOR: Looking at male cable end, fill in pins used.

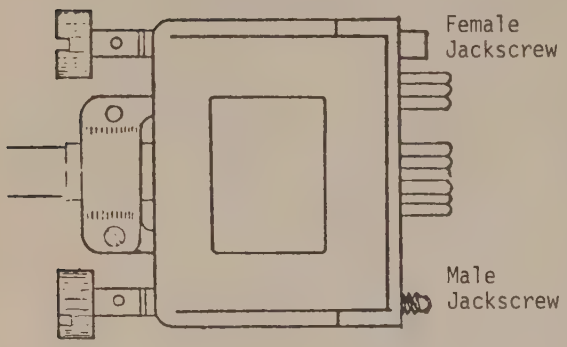
COL. 1	COL. 2	COL. 3	COL. 4	COL. 5	COL. 6
PIN	CIRCUIT	SIGNAL	TO:	ASSOC.	COLOR
A	101	EARTH GROUND.	-		
B	102	SIGNAL GROUND.	-		
C	105	REQUEST TO SEND	DCE		
D	106	CLEAR TO SEND	DTE		
E	107	DATA SET READY	DTE		
F	109	RECEIVE LINE SIGNAL DETECT	DTE		
H	108	DATA TERMANAL READY	DCE		
J	125	CALL INDICATOR	DTE		
R	104A	RECEIVED DATA	DTE	T	
T	104B			R	
V	115A	RECEIVE SIGNAL	DTE	X	
X	115B	ELEMENT TIMING		V	
Y	114A	TRANSMIT SIGNAL	DTE	AA	
AA	114B	ELEMENT TIMING		Y	
P	103A	TRANSMIT DATA	DCE	S	
S	103B			P	
U	113A	TRANSMIT SIGNAL	DCE	W	
W	113B	ELEMENT TIMING		U	
K	F1			M	
M	F1			K	
L	F2			N	
N	F2			L	
Z	F3			BB	
BB	F3			Z	
CC	F4			EE	
EE	F4			CC	
DD	F5			FF	
FF	F5			DD	
HH	N1			KK	
KK	N1			HH	
JJ	N2			LL	
LL	N2			JJ	
MM	F			NN	
NN	F			MM	

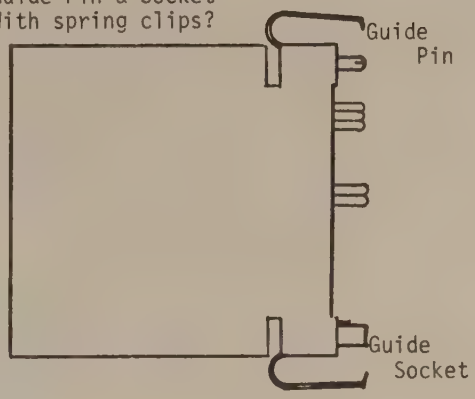
Atlantic Research Corporation Teleproducts Division
7401 Boston Boulevard, Springfield, Virginia 22153

V.35 Mechanical Used in _____ By _____
Country Customer

1. Which locking mechanism looks like yours?

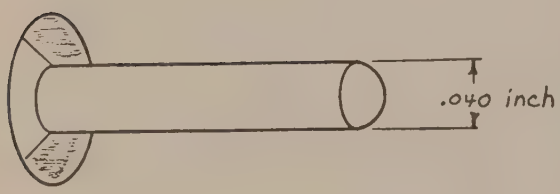
( ) Jackscrew OR ( ) Guide Pin & Socket
( ) With spring clips?

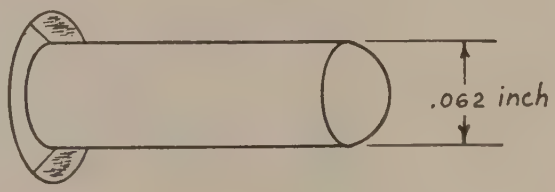




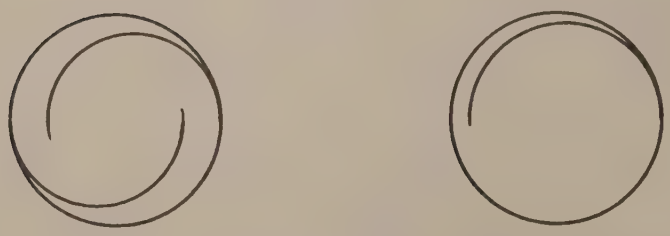
2. Which is located on the same end with Pin A?
( ) Female Jackscrew (as shown) ( ) Guide Pin (as shown)
( ) Male Jackscrew ( ) Guide Socket

3. Measure Pin diameter and record _____. Closest size is:
( ) .040 inches (1. mm) OR ( ) .062 inches (1.6 mm)?





4. Where threaded Jackscrews are used are they
( ) Double lead threads; OR ( ) Single lead threads?



Appearance of thread viewed from end.

APPENDIX D
CONNECTORS AND T-CABLES

ALTERNATE IFA CONNECTORS

IFA Interface	Connectors
Current Loop	Telephone plug, plastic handle, 1/4 in. 2 conductor Switchcraft C-240 or similar.
X.20/X.21	15-pin sub-mini D DAM-15P DAM-15S Cinch or similar
RS-232	25-pin sub-mini D DBM-25P DBM-25S Cinch or similar
RS-449	37-pin sub-mini D DCM-37P DCM-37S Cinch or similar 9-pin sub-mini D DEM-9P DEM-9S Cinch or similar
Bell 303	Burndy 12 position coax MD12 MXR chassis MD12 MXP cable
V.35	MIL-C-22857C MRAC-34P-JTC6-H MRAC-34S-JTC6-H Pins Separate 100-2520 P/S Winchester Electronics

GENERAL PURPOSE INTERFACE T-CABLES

T-Cable	Cable Model No.
9-Pin	CA-42-1-L
15-Pin	CA-35-1-L
25-Pin	CA-18-1-L
37-Pin	CA-41-1-L
V.35 English	CA-36-1-L
V.35 Metric to English Monitor	CA-36-2-L

ACCO USA
WHEELING, ILLINOIS 60090
25077
0 50505 25077 6
TANGERINE/TANGERINE/ANARANJADO ROJI
MADE IN USA